INTERNATIONAL

MARINE ENGINEERING

Published Monthly by the ALDRICH PUBLISHING COMPANY

Member of The Associated Business Papers, Inc.

6 EAST 39th STREET, NEW YORK — 8 BOUVERIE ST., LONDON, E. C.

Edited by H. H. Brown

H. L. Aldrich, President and Treasurer
Assoc. Member of Council, Soc. N. A. and M. E.

George Slate, Vice-President
E. L. Sumner, Secretary

E. J. P. Benn, Director and Publisher
Associate Inst. N. A.

Contributing Editors

William T. Donnelly — H. McL. Harding — William Gatewood — Professor C. H. Peabody
Commander S. M. Robinson, U. S. N. — Captain C. A. McAllister, U. S. C. G. — Rear-Admiral C. W. Dyson, U. S. N.

Vol. XXIV — JULY, 1919 — No. 7

Giant Strides in Ship Production

THE report of J. L. Ackerson, vice-president of the United States Shipping Board Emergency Fleet Corporation, of deliveries, launchings and keel laying of all classes of ships for April and May, 1919, shows that the shipyards of the country are making giant strides in ship production.

In April there was a total delivery of 111 ships aggregating 368,476 gross tons, or 543,720 deadweight tons. In April, 1918, the total delivery was 31 ships aggregating 114,274 gross tons, or 171,413 deadweight tons. In May of this year the total delivery jumped to 136 ships of 511,014 gross tons, or 768,025 deadweight tons, as against 43 ships of 169,608 gross tons, or 254,413 deadweight tons, last May.

Launchings also made a high mark of progress in the shipyards. In April, 1919, 118 ships of 390,942 gross tons, or 586,266 deadweight tons, were sent down the ways. In April, 1918, 46 ships of 150,152 gross tons, or 225,230 deadweight tons, were put overboard. In May of this year 137 ships of 470,634 gross tons, or 705,958 deadweight tons, took the water as against 74 ships of 243,502 gross tons, or 365,255 deadweight tons, in the same month last year.

The report shows that contract steel ships constituted the great bulk of launchings and deliveries for April and May, whereas in the corresponding months of last year the deliveries were almost exclusively of requisitioned steel ships and the launchings were chiefly of requisitioned steel ships and contract wood ships.

Reinstatement of Shipbuilding Contracts

SHIPBUILDERS throughout the country, and particularly on the Pacific Coast, have been suffering from the cancellation or suspension of contracts by the Emergency Fleet Corporation and from the uncertainty which surrounds the future policy of the Government regarding the merchant marine. Naturally, shipowners and others who might be inclined to purchase ships or order them built at this time are hesitating until they can find out what the attitude of Congress will be toward the Government shipbuilding programme.

At present the combined cancellations and suspensions of shipbuilding contracts amount to 2,500,000 tons. On the Pacific Coast, where 52 percent of the merchant shipping was produced during the war, and where the shipyards have been heavily hit by cancellations or suspensions, the shipbuilders are asking the Government merely to continue in operation enough work for a reasonable time to enable the yards to get on their feet in private enterprise. Most of the shipbuilders apparently are ready to take new contracts at from $30 (6/5/0) to $35 (7/5/10) less per ton, if the amortization on cancelled contracts is taken care of. With profits of only 4½ or 5 percent or less on Government work, which is said to be an average figure for a Pacific Coast shipbuilder, some of the yards obviously will have difficulty in continuing operations in the face of cancellations of Government contracts and the lack of orders from private interests while waiting for the Government to decide its shipping policy.

Some encouragement, however, may be found in the attitude of the Senate Committee on Commerce, which will probably go on record as favoring the reinstatement by the Shipping Board of a sufficient number of suspended contracts to tide the private shipyards over the period of readjustment. J. H. Rosseter, head of the division of operations of the Shipping Board, has also indicated that reinstatement of suspended contracts is contemplated within a month or so where there are vacant ways. Probably thirty vessels, ranging from 8,400 to 11,300 tons, will soon be reinstated. In fact, it is understood that the Shipping Board will reinstate contracts to the extent of its funds in so far as vessels of large size are concerned, although all contracts for vessels of small tonnage will be cancelled. As a condition incident to the reinstatement of contracts, shipbuilders will be expected to reduce headway in their yards and also prices.

Superheated Steam

HIGH-PRESSURE, high-temperature steam, having a considerable degree of superheat, is thermodynamically of great efficiency in reciprocating engines and turbines. Land practice has borne out this theory, and the efficiency of well-designed engines has been increased from eight to twelve percent. Marine engineers and shipbuilders in this country, however, have as yet made little attempt to utilize this method of increasing the power of an installation, while other countries in doing so have realized an increase as great as fifteen or twenty percent. England, France, Japan and other foreign powers have used superheated steam to a considerable extent on the latest of their fast naval craft, as well as on merchant vessels.

The British torpedo-boat destroyer *Turquoise*, which recently completed her official trials, holds the world's record for speed by attaining an average of 39.6 knots for a four-hours' continuous run on the Clyde river course. The *Turquoise* type vessels, several of which gave remarkable service during the war, are all equipped to use superheated steam in their turbines, and their efficiency by its use has been increased between ten and fifteen percent. Steam is supplied in these cases at 265 pounds pressure and about 150 degrees superheat, which is a quality of steam quite easily attained at this pressure. As the pressure required in an installation is reduced, superheating is more easily accomplished and in all cases will give a marked increase in the efficiency.

At a time like the present, when every economy of

Generated on 2024-09-12 07:52 GMT / https://hdl.handle.net/2027/uiug.30112004006158
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

operation must be practiced in order to enable American vessels to compete successfully with foreign shipping, the use of superheated steam in merchant vessels should be more generally adopted.

Women as Naval Architects

BY voting at its last meeting to admit persons from both sexes to membership, the Institution of Naval Architects has sanctioned a custom that is new to professional organizations in the marine field. After a referendum submitted to the members of the Institution regarding this matter, which resulted in a favorable vote, the council recommended an alteration of the by-laws of the Institution so that women could be admitted to membership. The motion to this effect, proposed by Sir William Smith and seconded by Sir Alfred Yarrow, was carried unanimously. Subsequently Miss E. M. Keary, of the National Physical Laboratory, who has already collaborated with one of the members in presenting a paper before the Institution, Miss R. M. Parsons, daughter of Sir Charles Parsons, and Miss B. E. Thornycroft, daughter of Sir John Thornycroft, were elected associates of the Institution, subject to the sanction of the council to the alteration of the rules.

The North-East Coast Institution of Engineers and Shipbuilders has also decided to admit women to membership, and the first lady to be admitted, Lady Parsons, is to be made an honorary fellow of the Institution at the meeting to be held in Newcastle this month.

The Still Engine

AN economy of fuel consumption at least 20 percent above that of any other type of prime mover is claimed for a new type of engine developed by William Joseph Still, a British inventor. The results obtained with various types of the engine using gas, gasoline (petrol) or heavy oil were presented recently in a paper read before the Royal Society of Arts in London by Frank E. D. Acland, member of the Institution of Civil Engineers.

The underlying principle of the system on which this engine operates consists in raising steam from the heat ordinarily lost in the cooling water and exhaust of internal combustion engines. Hitherto such steam as has been recovered from these sources has been used in external engines subject to all their negative work in accelerating and retarding the moving parts and to losses from radiation, friction and condensation. In the Still engine the steam generated by the heat from the cooling water and exhaust gases is expanded in the internal combustion engine itself at the back of the main piston, one stroke being performed by the steam pressure and the other by the combustion pressure. In this way it is claimed there is no loss by condensation, as the steam picks up heat during its expansion stroke from the surfaces of the combustion cylinder, which are of necessity at a higher temperature than the steam itself.

How great the opportunities are for improving the efficiency of a prime mover by recovering the heat energy in the fuel ordinarily wasted is, of course, well known. In the steam engine this amounts to about 80 percent, and in the internal combustion engine to from 60 to 75 percent. In the case of the internal combustion engine, however, these losses are capable of reduction and, to a considerable extent, of recovery. This is what the Still engine is designed to accomplish, and, according to the results given in the paper, an increase in fuel efficiency of at least 20 percent has been attained.

In the application of the Still engine to commercial marine work, the two-stroke single-piston type, in powers of 100 and 400 horsepower per cylinder, is being adopted. Engines of this type at 120 revolutions per minute, with a cylinder 22 inches in diameter by 36 inches stroke, giving 4,200 shaft horsepower on two shafts, with all auxiliaries and water, would approximate about 600 tons. It is pointed out that a geared turbine plant in a similar ship would weigh 20 percent more and would consume approximately 2,000 tons more fuel for a double voyage lasting 1,000 hours.

Improved Terminals

WE take the liberty of quoting as follows from a private letter:

"If the shippers and importers of this country, looking forward to successful competition with European countries in export trade, had any conception of the almost criminal inefficiency of freight movement at ports and to what a great extent they were to blame, and with what enthusiasm shipowners and terminal operators would welcome their co-operation in modernizing American marine freight terminals, Americans could look at such European ports as that of Hamburg without blushing and American sea supremacy would no longer be a question of seamen's wages."

For years MARINE ENGINEERING has been hammering at the subject of proper mechanical equipment at marine terminals. As we have often stated, there is a potential saving of approximately fifty million dollars a year in the handling of freight at these terminals. For some reason many important men connected with steamship and steamboat companies do not seem to appreciate the great importance of efficient freight-handling machinery, and yet, as the writer from whom we quote intimates, the question of proper terminals is more important than that of seamen's wages.

Vessel Salvage

YEARS ago salvage operations were directed to recovering the cargo from sunken vessels, and not the vessels themselves. Now the submerged ships constitute the "buried treasure," and it is in this direction that all the salvage companies are likely to be working at high pressure for many months to come. As everyone knows, the war has taken a very heavy toll of the world's shipping, but probably few people visualize the scene that would be presented to the eye if they could explore the bottom of the ocean for miles round many a coast-line.

Round the coast of Great Britain, for example, the seabeds are thickly strewn with wrecks, the North Sea being literally covered with vessels that can never be raised, owing to the great depth at which they are sunk. Round the Scilly Isles half a dozen vessels have been lying at a time, waiting for the attention of salvers; while all around the Mediterranean sunken craft are numerous. Round other more distant coasts the casualties have been as heavy, scores of ships lying sunk off the Murman coast alone.

The history of the British Admiralty's Salvage Section is but another example of the resourcefulness and adaptability of the naval authorities in the ever-changing developments of the war.

The Salvage Section was originally intended to look after craft casualties in the fleet, but with the rapid development of the submarine warfare it soon became apparent that merchant vessels were equally important, and the Admiralty accordingly extended the operations of the

Generated on 2024-09-12 08:04 GMT / https://hdl.handle.net/2027/uiug.30112004006158
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

section to all classes of sunken craft. Unceasingly throughout the war the salvers have been employed in their work of supreme usefulness, and have run up a grand total of nearly 500 vessels salved, representing about $195,000,000 (£40,000,000) worth of craft. In every case the ships, after the necessary repairs, were used again. In several instances a vessel was torpedoed a second time, and sunk, and a second time was raised by the Salvage Section and sent upon its ocean journeys.

The method of raising the submerged vessels is exceedingly ingenious. Two barges, or lifting craft, raise the sunken vessel by means of a wire cradle. The damaged ship is then towed into shallow water.

The Admiralty is putting its own section out of action in order that it may not compete with private enterprise, of which there is likely to be no lack in the future.

Control of Cooling in Castings

FOR preventing the difficulties and defects that arise from the uneven contraction of irregular masses of metal after casting, Mr. Cecil Greenhill, of Gloucester, has patented a method which depends on the application of electrical heat to the thinner and less dense parts of the castings, with the object of keeping the falling temperatures the same as those of the thicker and denser parts. As the method of application, he suggests casting runners or ribs on the thinnest sections and applying heat electrically by dropping electrodes into the molten metal and allowing the preliminary cooling to 1,300 degrees C. to make the joint.

In cooling, the thinner sections cool more rapidly than the thicker ones, but if an electrical current is passed through, more heat will be developed in the thinner ones because they have greater electrical resistance than the thicker ones. The amount of current required would not be so large as might appear at first sight, since only losses of heat have to be replaced. It would therefore not be anything like so great as would be required to heat bodies of metal up to the temperatures at which they are treated, and it would be designed merely to keep the thinnest portions at the same falling temperatures as the thickest ones.

The method of procedure might be varied so that the current might be used either through the whole range of temperature in cooling or through portions only. In the case of steel, it need perhaps be applied only at the critical periods of steel formation, say between 1,300 and 1,050 degrees C., after which the casting might be cooled naturally without harm; or the casting might be kept at 1,050 degrees, and, in shapes where the mold could be stripped, the mold might be removed and the casting placed in the annealing furnace, thus saving reheating to this temperature for annealing.

LETTERS TO THE EDITOR

The Steering of Ships

The editorial on "The Steering of Ships," which was published in the March issue of MARINE ENGINEERING, is a very clear analysis of what takes place when helm is given to a ship.

The area of a rudder is usually taken as a percentage of the *immersed* longitudinal plane of the vessel for which it is intended. This percentage is determined more or less empirically.

If too small a rudder area exists for a given vessel fitted with steam steering gear, it is scarcely noticeable, as the angle of helm is increased until the desired turning effort is obtained and vice versa.

The dimensions of rudders and parts are determined either by empirical formulæ or the classification tables. However, in view of the present status of the steering problem, some definite standards for maneuvering power should be determined for the various classes of ships. This may be given as the tactical diameter in terms of the ship's length.

Brooklyn, N. Y. CARL E. PETERSEN.

What Is the Matter With the Society of Naval Architects and Marine Engineers?

There has never been a time during the past half century when there has been such a need for the people most experienced in shipbuilding and ship operating to devote their best thought to the subject of building up the American merchant marine as there is today.

There is a Society of Naval Architects and Marine Engineers, which undoubtedly has most of these men as members, and yet with all the conferences and meetings that have been held on the subject of building up the merchant marine we hear no mention made of this society—nor is the society officially, nor any officers representing the society, called upon to give advice and the benefit of their experiences and judgment.

Isn't the society showing too much high-brow dignity and too little real, practical usefulness? It gets its name in the papers for three days at the latter part of November by having an annual meeting and a banquet, at which a lot of highsounding phrases are let loose, but when it comes to practical and useful effort the society is not heard from.

In looking over the names of the members of the council, I notice that there are a number of men who never attend the meetings, and do not even attend the banquet. Why are such men continued on the council when they show no interest whatever in the society?

The council also contains the names of a number of men who have nothing whatever to do with building ships, repairing ships or operating ships.

Isn't it about time that the society be put on a useful basis? Ought there not be a committee of some kind always ready to take any action that will help the best interests of the American merchant marine? There is no reason why such a great society as this is (or ought to be) should go to sleep the latter part of November and stay asleep until the next annual meeting is held 362 days later. Other technical societies are waking up to the needs of the fields which they represent, and several of them are doing splendid work. The Society of Naval Architects and Marine Engineers ought to wake up and stay awake. It should get rid of all men on the council who are not actively engaged in marine work, and it should have a committee always ready to be of any help possible in building up our merchant marine.

Cannot something be done to arouse the society to these needs, so that it can take an active part in restoring the merchant marine, not only in volume of tonnage but in quality of ships? If the society cannot prove that it is really worth something, it might just as well "close up shop" and go out of existence. It has been of little value in the past, and has not shown any inclination to wake up under present conditions. Let's have a real society or none!

A MEMBER.

Generated on 2024-09-12 07:49 GMT / https://hdl.handle.net/2027/uiug.30112004006158
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Fig. 1.—East Side of Plant, Showing Plate and Angle Storage, Pickling Tanks and Cranes, Plate and Angle Shop, Assembly Shop and Building Slips

The Victory Destroyer Plant at Squantum

Fifteen Million Dollar Plant Erected by the Government for Building Destroyers—Operated by the Bethlehem Shipbuilding Corporation

WHEN the United States entered the war it was apparent that the greatest possible activity of its shipyards was utterly unable to cope with the situation. The merchantship loss of tonnage had to be made up if it were possible. Warship construction had to be pushed to the utmost. Hence the absolute necessity for new shipbuilding plants. The insistent call for destroyers in large numbers was answered by the building of the big Victory Plant at Squantum, Mass.

Monks & Johnson, Boston architects and engineers, were commissioned by the Government to design and supervise the construction of this large undertaking—the $15,00,000 (£3,075,000) destroyer plant. The main plant, located at Squantum, Mass., is not merely for fitting out hulls; it turns out finished destroyers from raw materials and those accessories and fittings which can be obtained elsewhere. Auxiliary or tributary plants are located at Tonawanda, N. Y., and Providence, R. I. In these plants, which are Government-controlled and owned, but operated by the Bethlehem Shipbuilding Corporation, are built the turbines and boilers which are shipped to the main plant at Squantum.

Scope of the Plant

Practically every kind of metal-working shop and warehouse had to be provided, except a foundry. To make a complete, efficient plant out of these buildings for fabricating metal and assembling the parts necessitated also auxiliary buildings and features, such as an administration building, powerhouse, internal transportation, bridges and roads, sewer system, wash rooms, restaurants, etc.

The plan (Fig. 4) shows clearly the location and arrangement of these buildings. It also shows the waterfront and the connection to steam railroads and street-railway lines leading to Boston, about six miles away. Appliances and apparatus for the conservation of labor are everywhere noticeable. This modern plant is laid out to handle all material and apparatus with the least possible lost motion and loss of time The movement of material through its various stages of fabrication follows the most direct path they can bring it, with the fittings, to the assembly. Provision is made for convenient storage of such parts as may be completed before required in the building slips, so that every step may proceed in an orderly manner with nothing to block progress or slow up construction.

Rapid Construction the Main Object

Careful planning and study were absolutely necessary, yet time was all-important. Fortunately, the Monks & Johnson organization included men who not only knew just what was needed, but worked so well with the Government that in an incredibly short time the plans and specifications were ready for the contractors. Standard constructions were adopted and apparatus which could be quickly obtained were specified. In short, the engineering was directed toward rapid construction, because the activity of the German submarine forcibly pointed to the urgency of destroyed construction. This shipbuilding plant is unique in that bad weather causes no delay, for every operation is carried on under cover.

Fig. 2.—General Machine Shop, Electrical Shop and Carpenter Shop

Generated on 2024-09-12 08:05 GMT / https://hdl.handle.net/2027/uiug.30112004006158
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

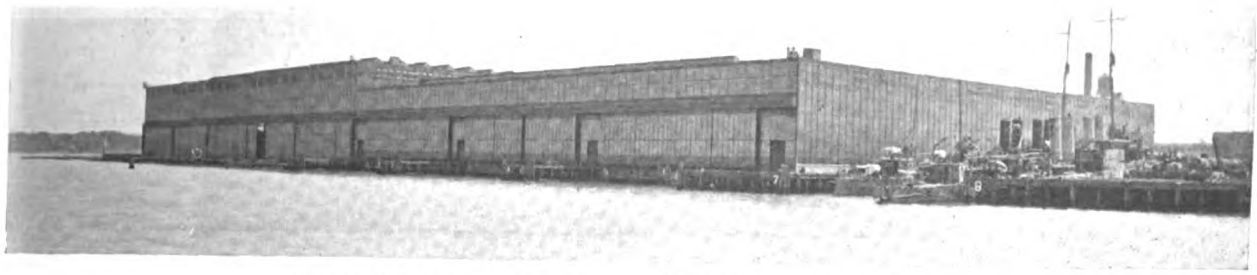


Fig. 3.—North End of Building Slips, Wet Slips and Open Dock

To get a working notion of this plant, one must glide over many of the usual but necessary details, paying most attention to the general plan and the factors which make rapid, systematic construction possible. While the warehouse and storage places are ample and equipped with electric cranes, industrial tracks, etc., it is the building slips and fitting-out docks that excite the real interest. Storage yards for plates and angles, the plate and angle shop, the frame and bulkhead assembly, are described by their names.

BUILDING SLIPS

Just beyond the frame and bulkhead assembly and between it and the building slips is the finished storage. This part of the plant is served by two lines of overhead cranes, running parallel to the waterfront. Plates and angles as they come finished from the plate and angle shop are brought to this finished storage on narrow-gage flat cars that are sorted and stored by the overhead cranes at the head of the building slip in which they are to be used.

Each building slip, of which there are ten, has two overhead crane runways extending the entire length of the ship across the finished storage and one bay into the assembly space. As these runways are much higher than the cranes in the assembly space the finished frames and bulkheads can be picked up by the building slip cranes and placed in their proper places in the ship. The building slips have inclined flooring on which the ships are

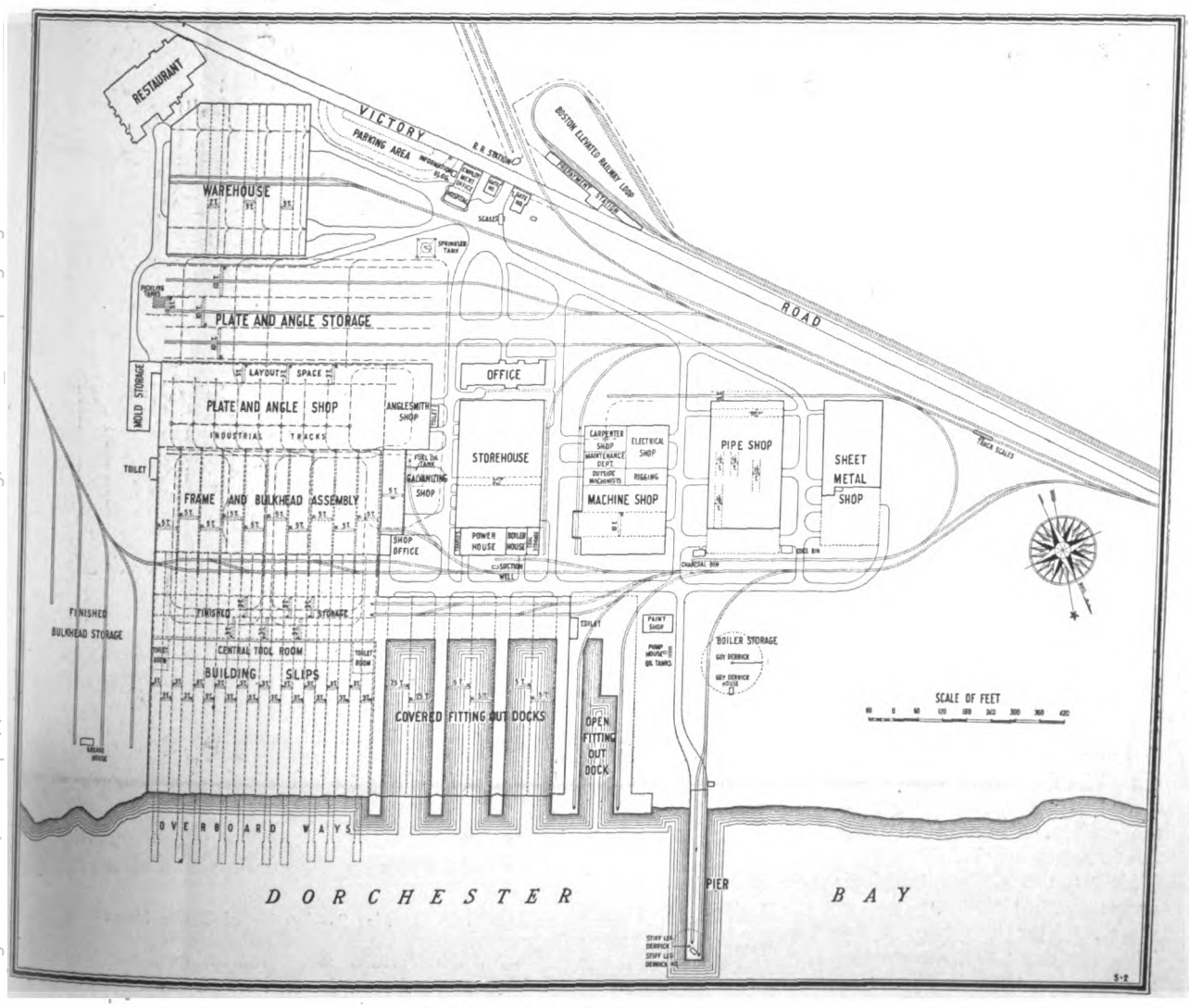


Fig. 4.—Plan of Squantum Plant

Generated on 2024-09-12 07:49 GMT / https://hdl.handle.net/2027/uiug.30112004006158
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

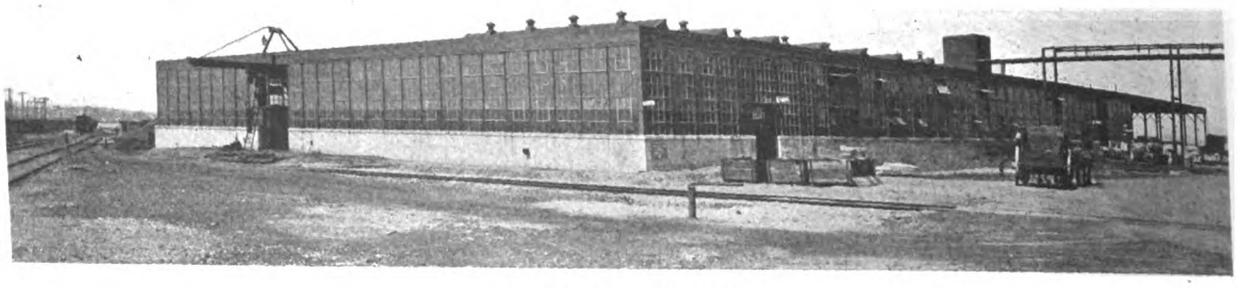


Fig. 5.—Sheet Metal Shops

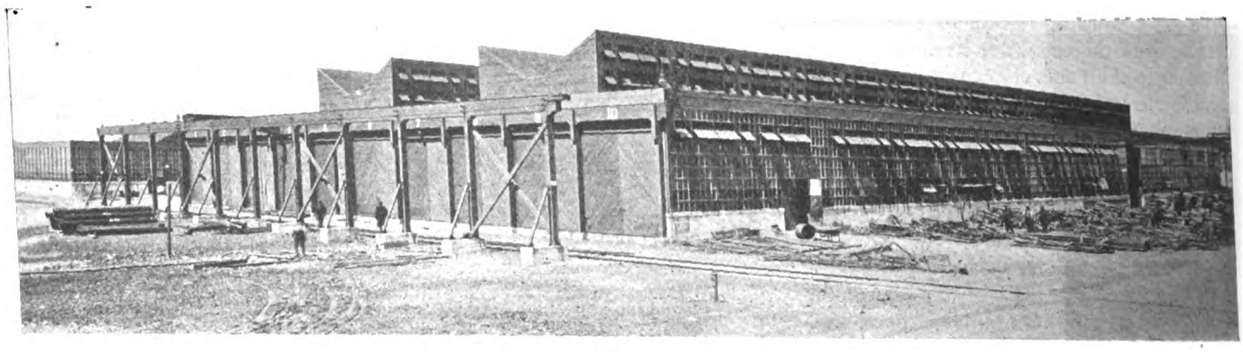


Fig. 6.—Pipe Shop

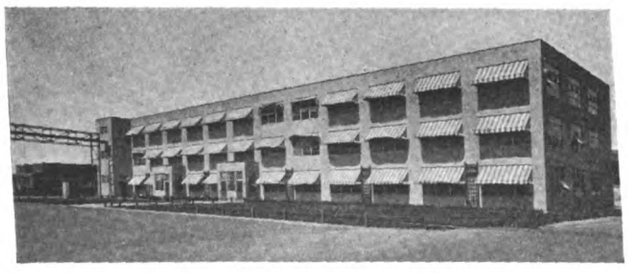


Fig. 7.—Administration Building

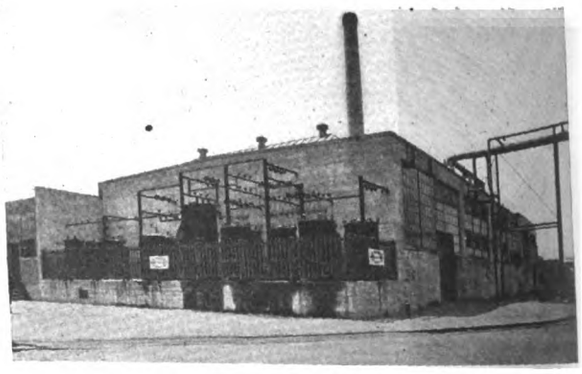


Fig. 8.—Power and Boiler House

built. The inner end of this flooring is about 16 feet above the general level, and this space provides ample headroom for the toolroom. This central toolroom is a convenient location for storing all the air and electric drills, reamers, and other small tools used in the building of slips. It also provides for a department for repairing and sharpening cutting tools.

FITTING-OUT DOCKS

Just west of the building slips are the fitting-out docks, which are also covered, and which are provided with sliding doors on the waterfront end. These fitting-out docks accommodate six destroyers. There is a crane over each destroyer, two of the cranes being of 25 tons capacity for handling boilers, engines, and other heavy parts, and the other four are of 5 tons capacity. The fitting-out docks receive material from the galvanizing shop and the general machine shop in which such machine work is done as cannot be done in an outside plant. The general arrangement of departments thus brings together the materials and the equipment so that the ships are nearly complete in the fitting-out docks.

Next to the fitting-out docks is an open dock which will accommodate two destroyers. Here the masts are put in place, and the complete destroyer is given a dock trial. This completes the sequence of construction of the destroyers, but there are some other features of this plant worthy of attention. West of the open dock is a pier

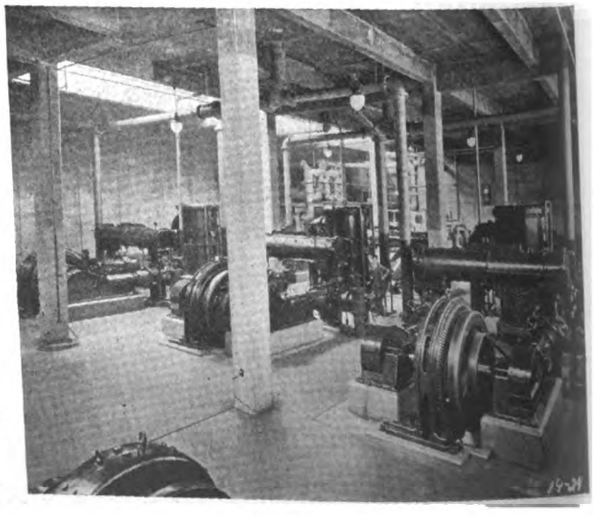


Fig. 9.—Interior of Power House

fitted with derricks and used primarily for unloading boilers and other apparatus which come by water. The boilers are stored in a space at the head of the pier.

Generated on 2024-09-12 07:47 GMT / https://hdl.handle.net/2027/uiug.30112004006158
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

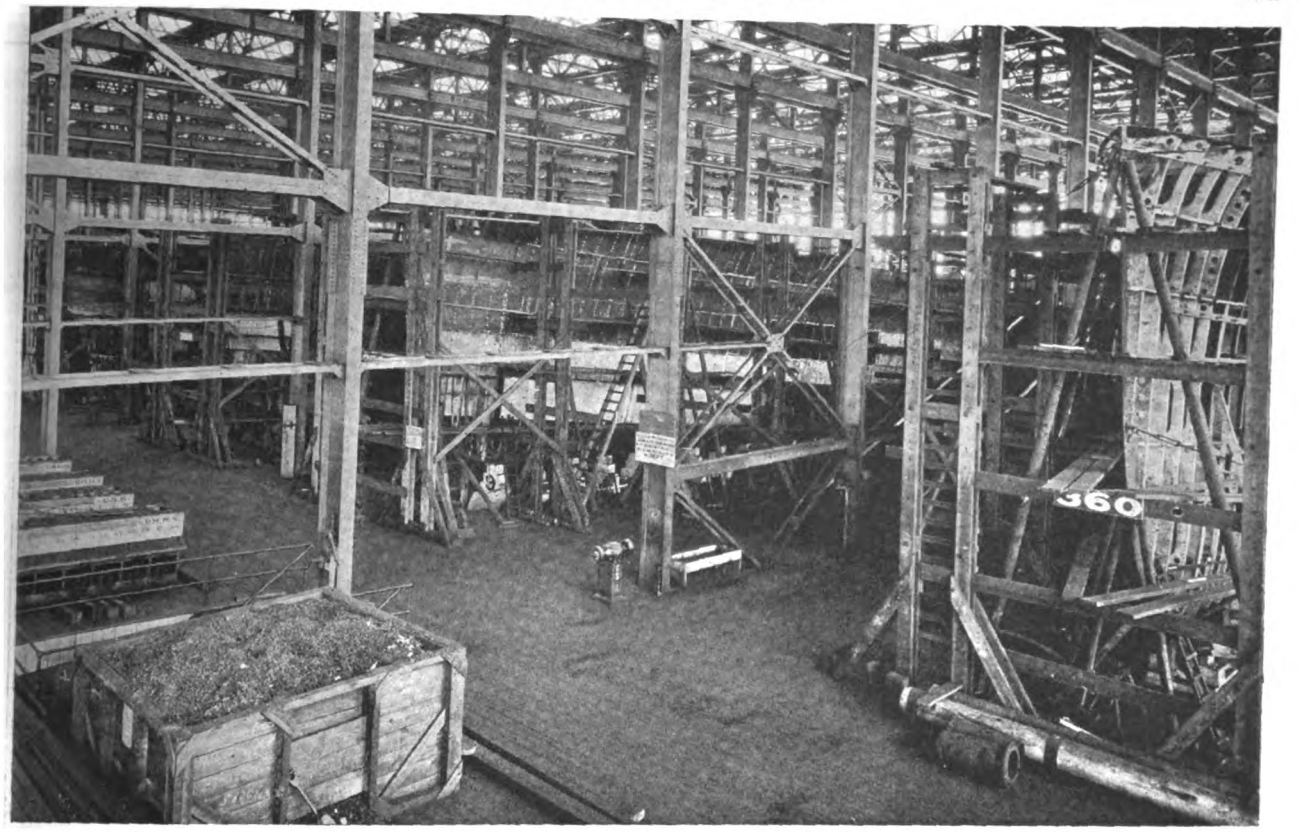


Fig. 10.—Head of Building Slips

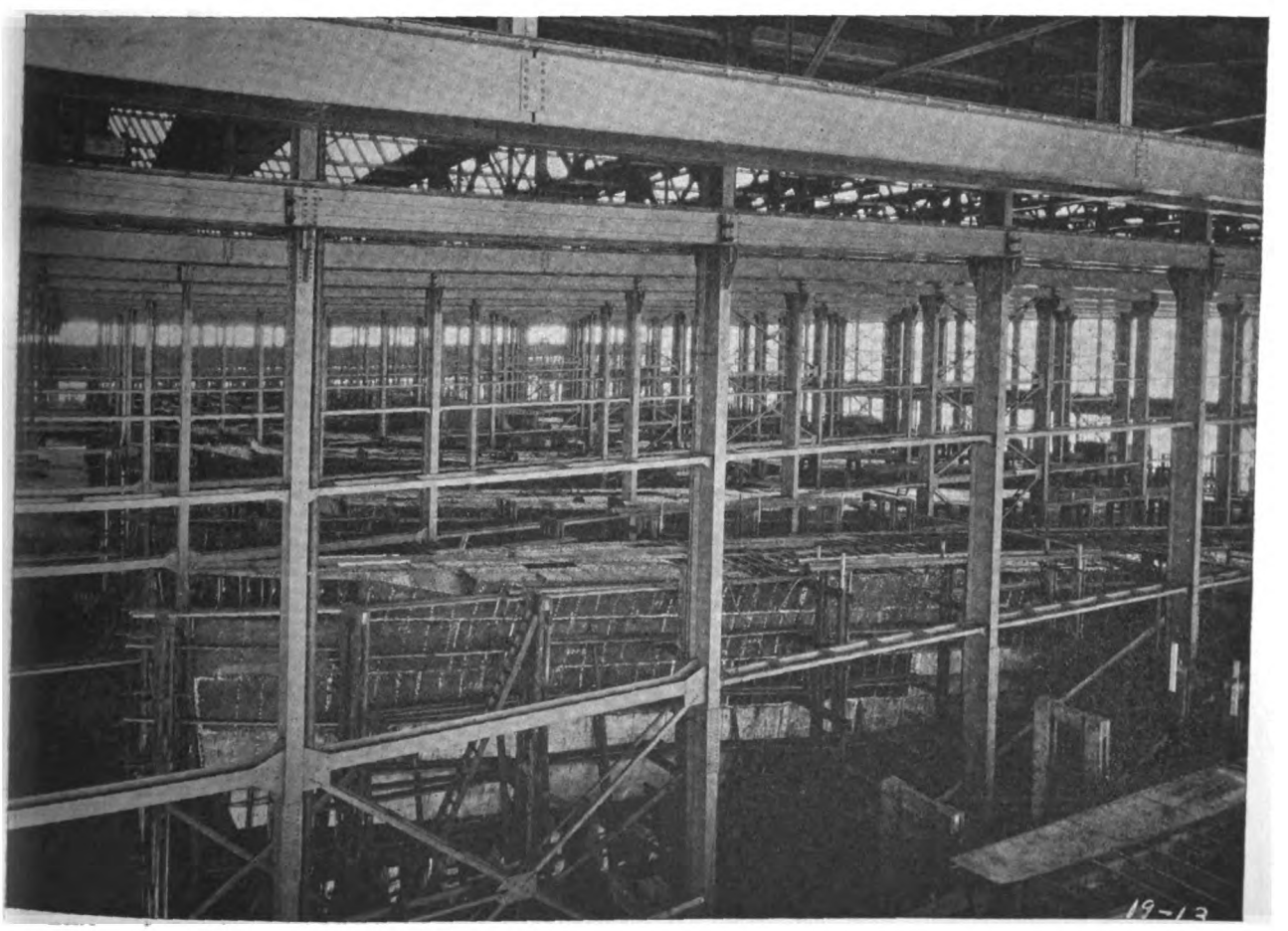


Fig. 11.—General View of Building Slips

Generated on 2024-09-12 07:50 GMT / https://hdl.handle.net/2027/uiug.30112004006158
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Fig. 12.—Interior of Plate and Angle Shop

Fig. 13.—Laying-Out Space in Plate and Angle Shop

Generated on 2024-09-12 08:04 GMT / https://hdl.handle.net/2027/uiug.30112004006158
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

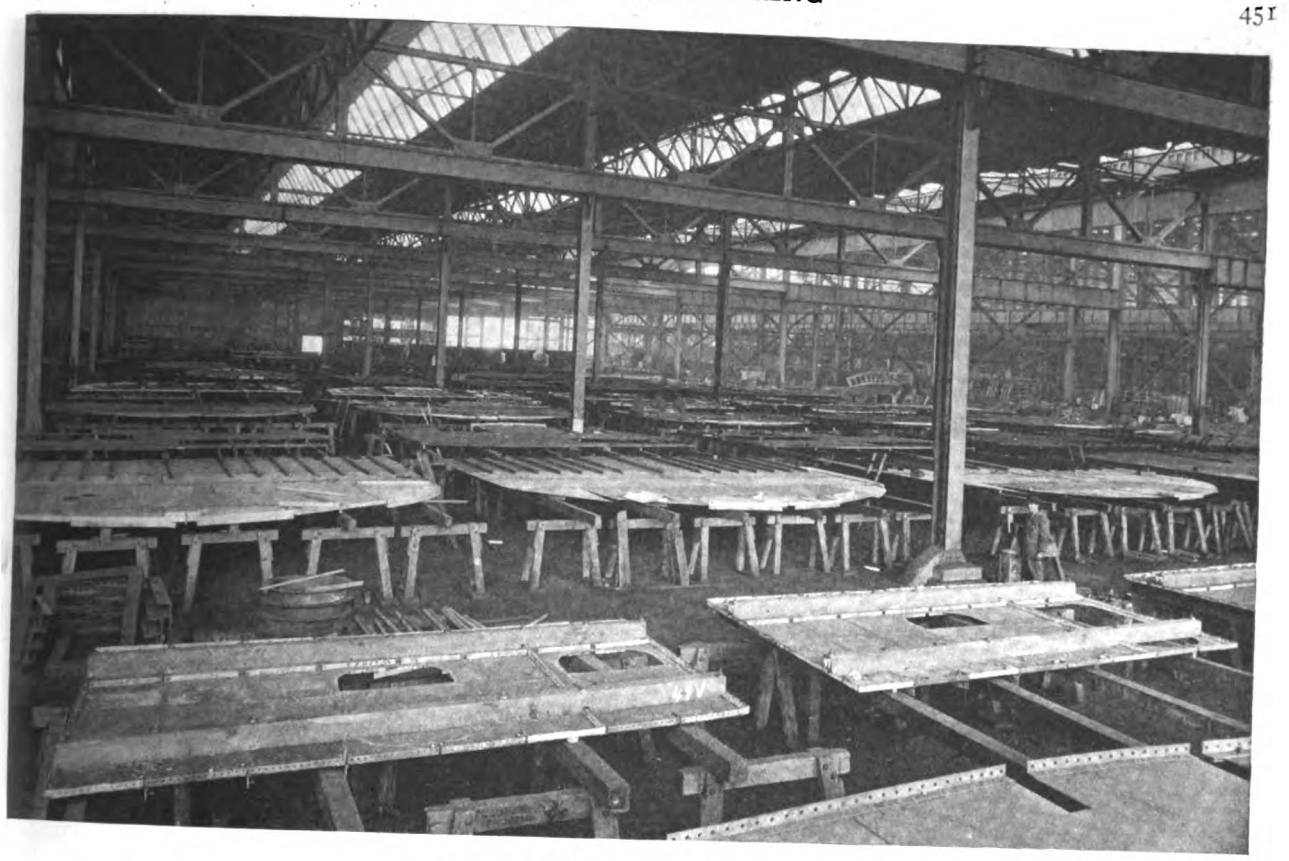


Fig. 14.—Bulkhead Assembly

Fig. 15.—Finished Storage at Head of Building Slips

Generated on 2024-09-12 08:02 GMT / https://hdl.handle.net/2027/uiug.30112004006158
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

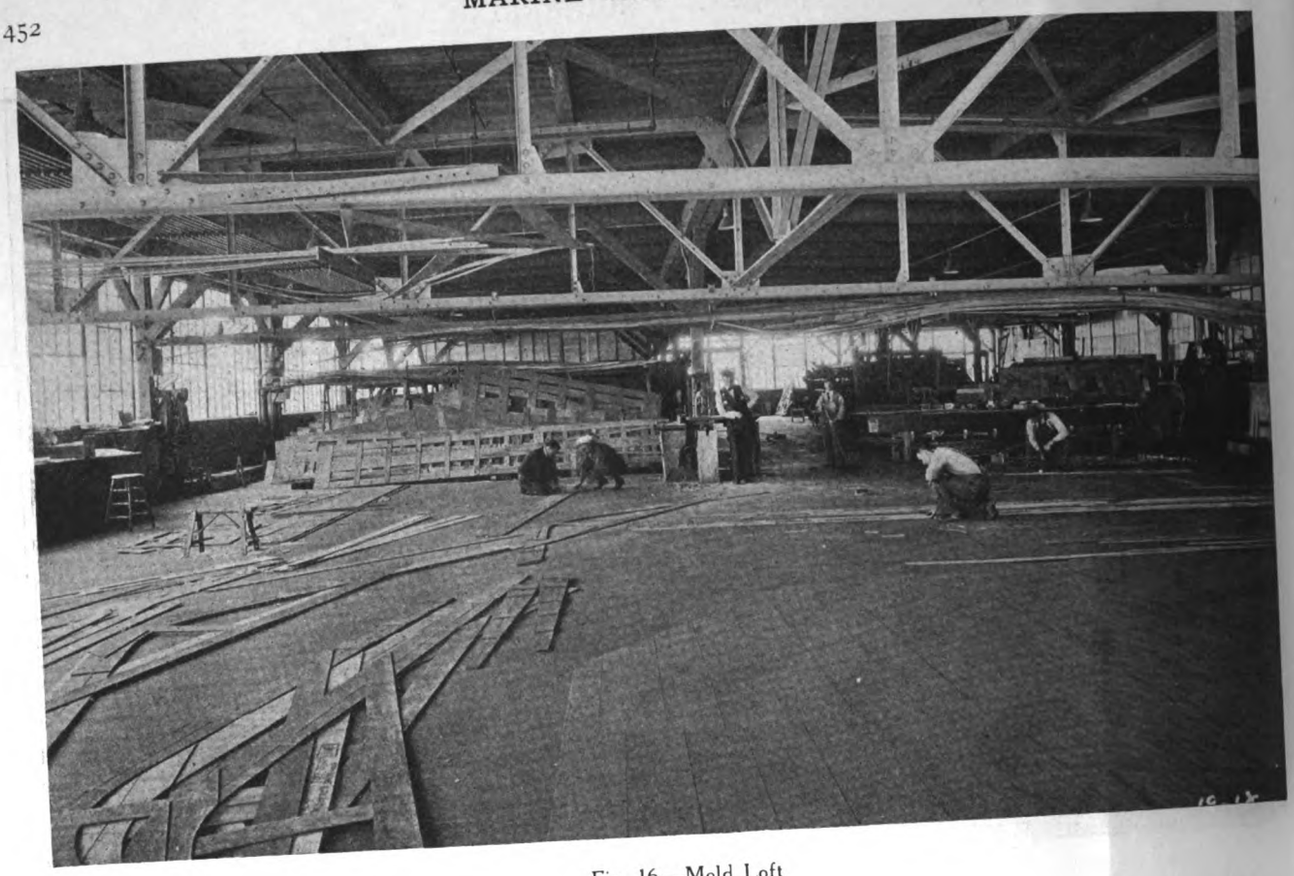


Fig. 16.—Mold Loft

Fig. 17.—Interior of Machine Shop

Generated on 2024-09-12 07:53 GMT / https://hdl.handle.net/2027/uiug.30112004006158
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

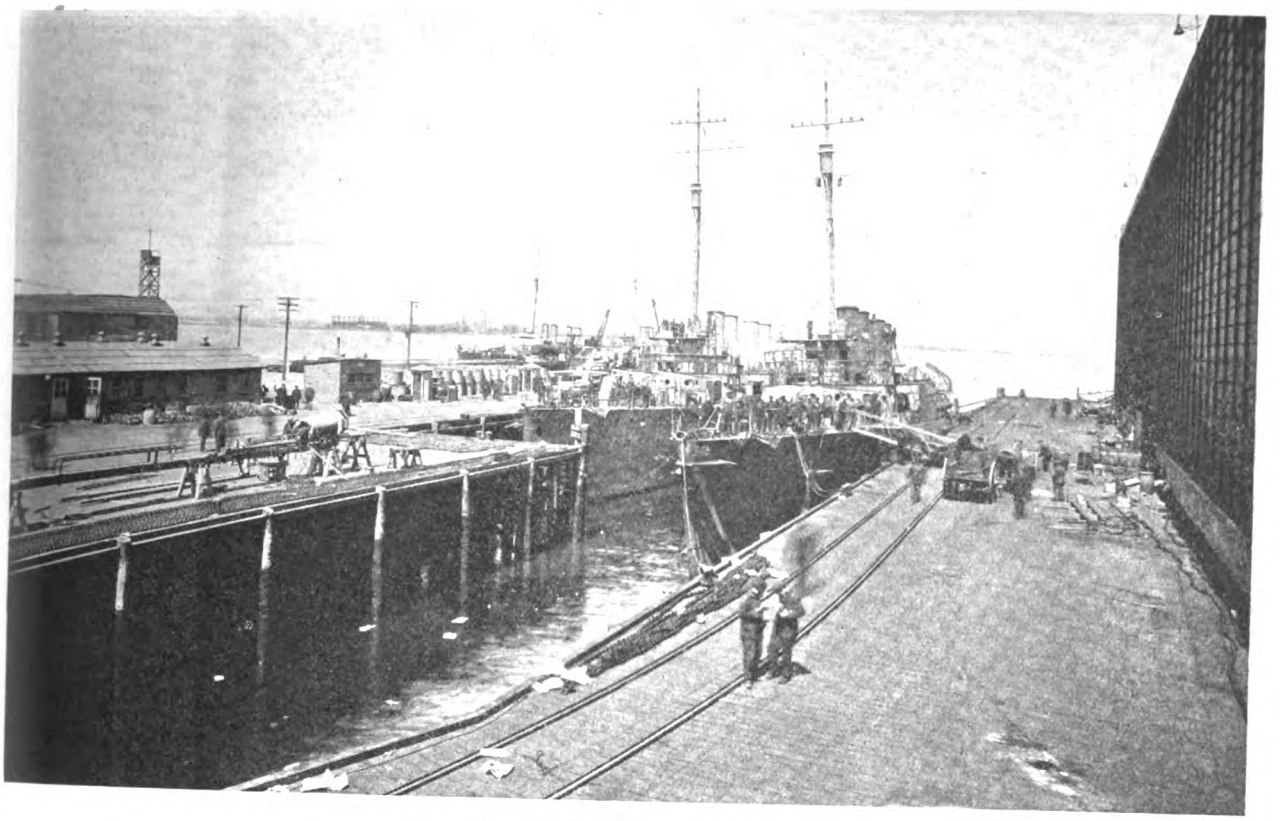


Fig. 18.—Open Fitting-Out Dock

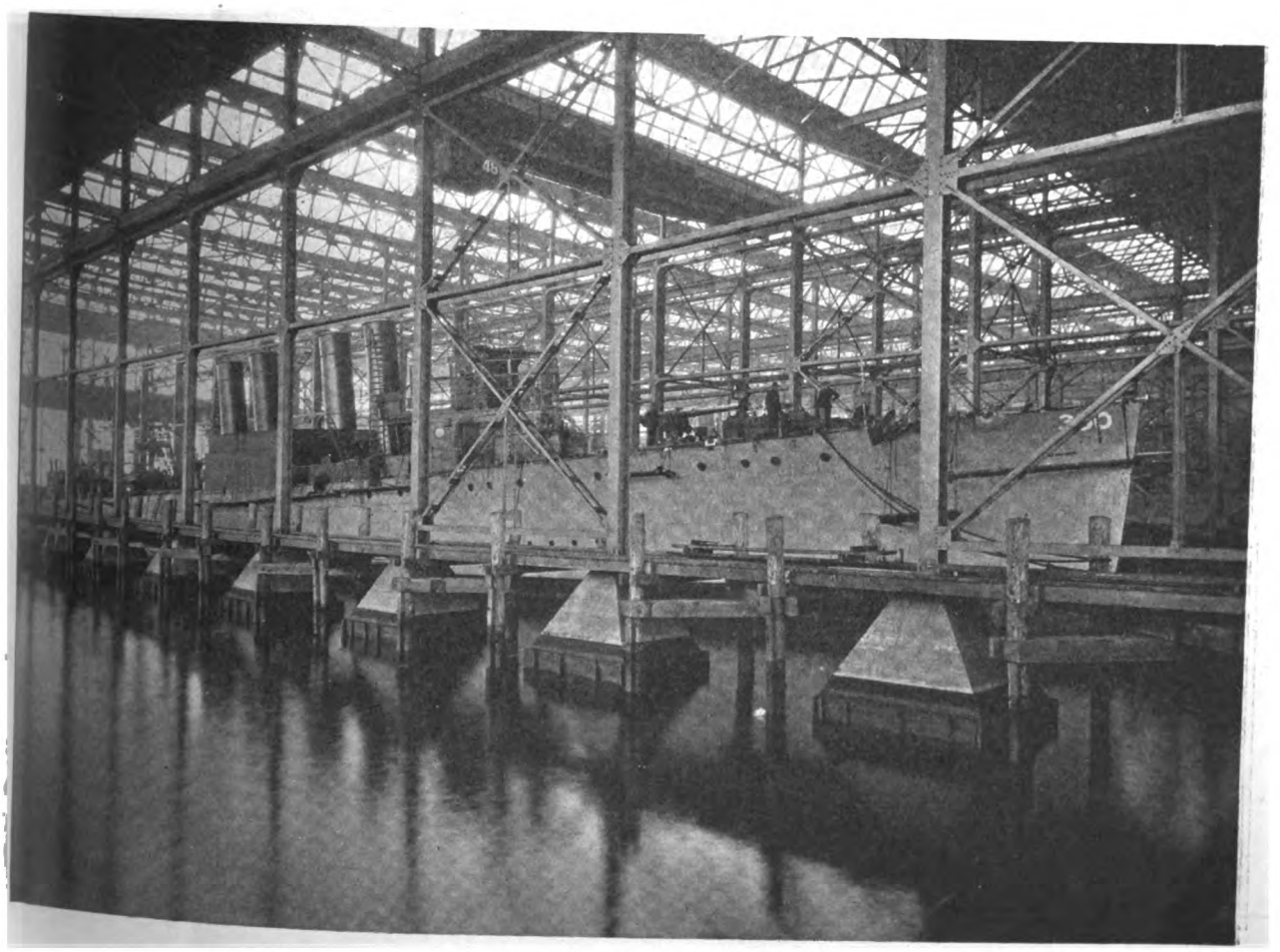


Fig. 19.—Interior of Wet Slips with Destroyer in Berth

Generated on 2024-09-12 07:52 GMT / https://hdl.handle.net/2027/uiug.30112004006158
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

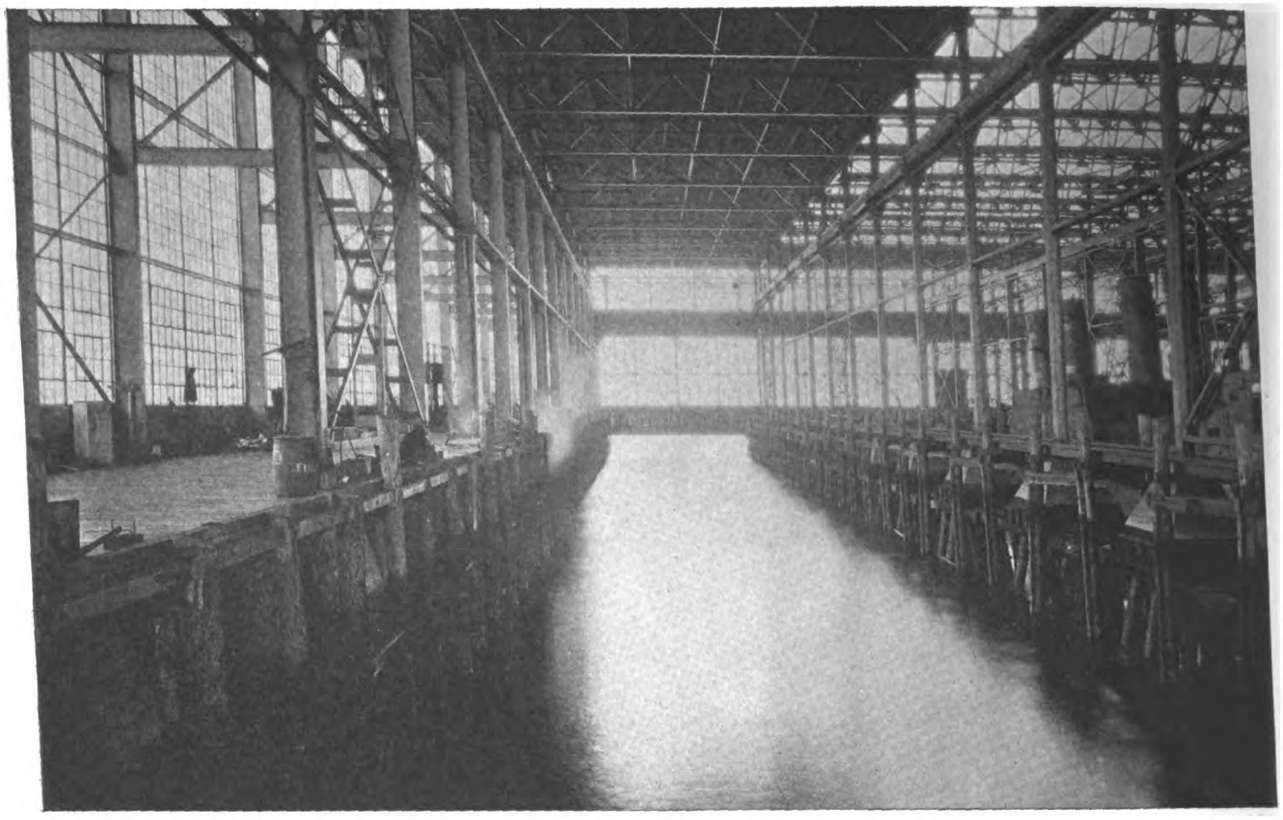


Fig. 20.—Wet Slip, Showing Pile Foundations

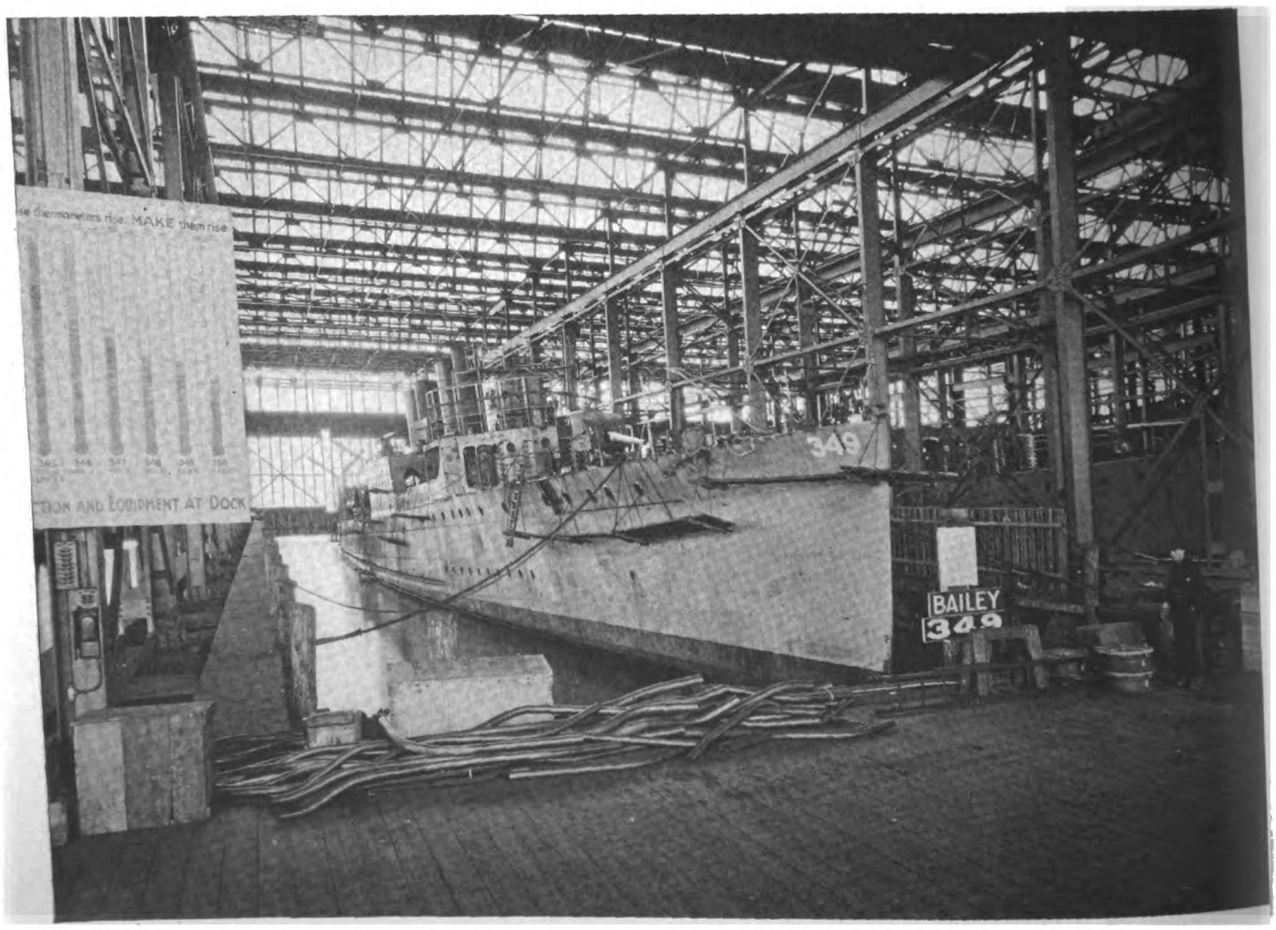


Fig. 21.—Destroyer Being Fitted Out in Covered Wet Slip

Generated on 2024-09-12 07:53 GMT / https://hdl.handle.net/2027/uiug.30112004006158
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

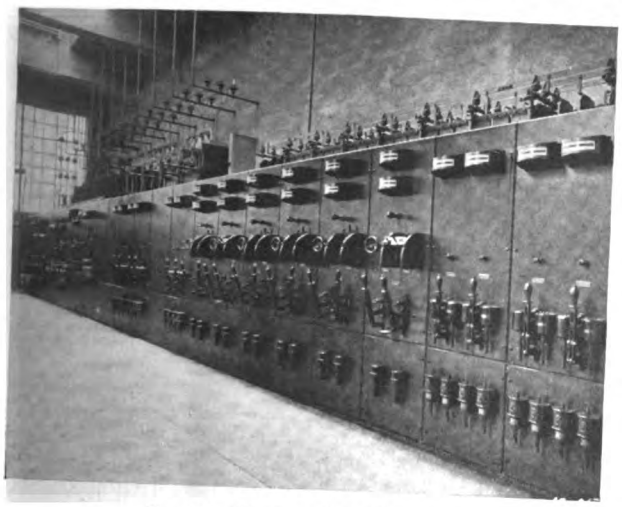


Fig. 22.—Front of Switchboard

North of the storehouse is located the boiler house and power plant. Power is obtained from the Edison Electric Illuminating Company and furnished at 13,000 volts. In the power house are two rotary converters for supplying direct current, and six air compressors having a total capacity of 10,000 cubic feet per minute.

POWER PLANT

The entire plant is equipped with automatic sprinklers with two fire pumps and a 100,000-gallon overhead tank.

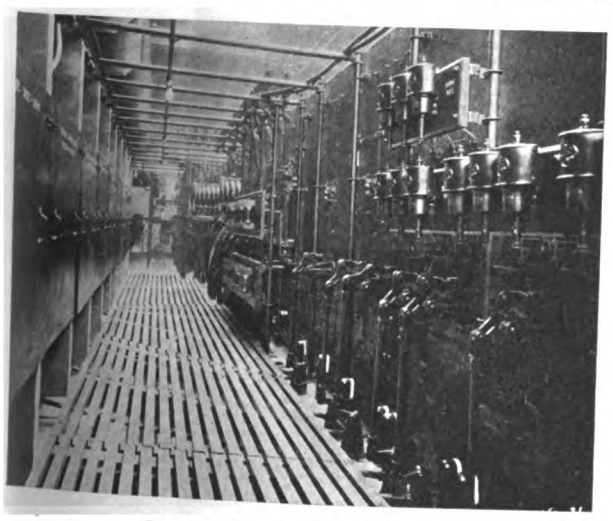


Fig. 23.—Rear of Switchboard

The plant has rolling stock consisting of ten locomotive cranes, two locomotives, and many flat and gondola cars.

Just south of the storehouse is the office or administration building, which contains also the offices of the United States Navy inspectors, and on the top floor a restaurant for office employees. The men working in this plant are well provided for with ample washroom facilities and a restaurant just outside the main yard.

Of all Government plants, including emergency war buildings, the Victory Plant gave the Government the least trouble, and is probably the only plant entirely free from criticism. From the beginning of the design to the completion of the plant there was as little friction here as in any of the large undertakings.

From the first it was expected that this plant would render real service in turning out destroyers. No spectacular effort was made to launch the first destroyer quickly, but rather the aim was to produce the greatest number of destroyers during the first few months following the completion of the plant. The building of this plant was so rapid, in spite of its being constructed during the worst winter recorded by the weather bureau, that the first destroyer was launched on July 18, 1918, nine months after Monks & Johnson were commissioned to proceed with the plans and specifications. This great speed of production was largely due to the co-ordination of the various buildings and the general layout of the plant; in fact, the arrangement is so logical that Mr. Harrold Yarrow, of Yarrow & Company, Ltd., of Scotland, and Yarrow's, Ltd., British Columbia, who recently visited this country on a tour of inspection, said, "Nowhere have I seen so well arranged and equipped a plant for turning out torpedo-boat destroyers as there is at Squantum."

Scotch Boilers Rolled 28 Miles Along California Coast

BY C. W. GEIGER

The accompanying illustrations show the different stages in the movement of six marine boilers aboard the full-powered motorship *Alabama*. These boilers were salvaged from the wrecked steamship *Bear* on the northern coast of California by the Porter Wrecking Company.

It was originally planned to ship the boilers to Shanghai on the steamship *Roscwood* under charter of the Overseas Shipping Company in November, 1917. When the vessel was ready, however, it was found, after repeated attempts,

Fig. 1.—Six Boilers Salvaged from S. S. *Bear*

that it would be impossible to get the boilers off the beach at Cape Mendocina, and the *Roscwood* had to proceed to Shanghai without the boilers.

A contract was then let to the Mercer, Frazer Company, Eureka, Cal., to haul the boilers along the beach to Eureka, 28 miles away. After five months the boilers

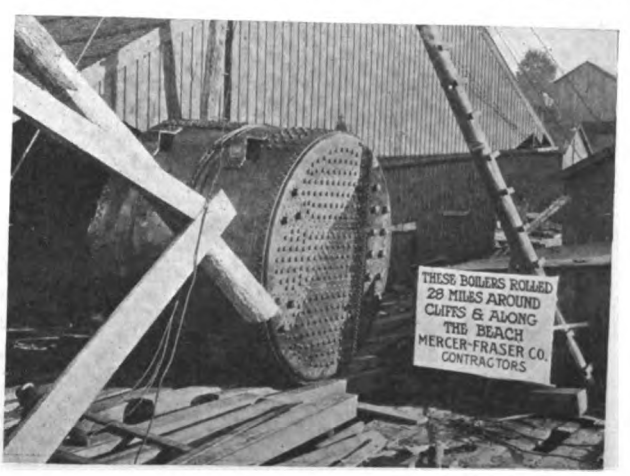


Fig. 2.—Equipment for Handling Boilers

Generated on 2024-09-12 07:52 GMT / https://hdl.handle.net/2027/uiug.30112004006158
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

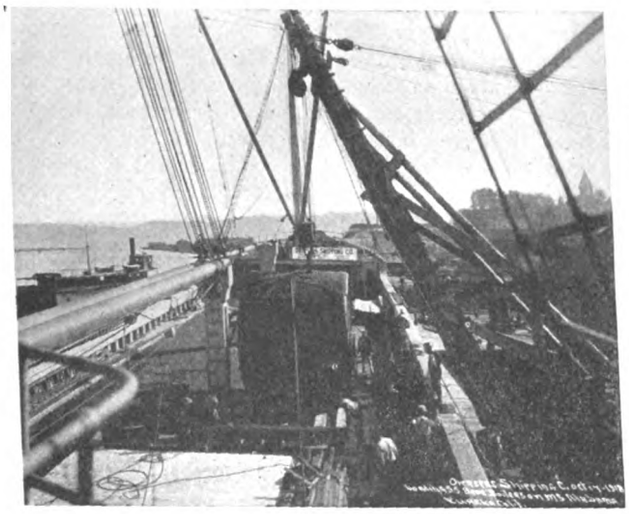


Fig. 3.—Loading Boilers on Motorship *Alabama*

reached Eureka, where they were loaded on the *Alabama*, which carried them to Shanghai on her maiden trip. The boilers will be installed on three steamers which are being built at the Chinese Government yards at Shanghai for the United States Shipping Board.

The boilers were transported by rolling them around cliffs and along the beach. Barges were also used at three

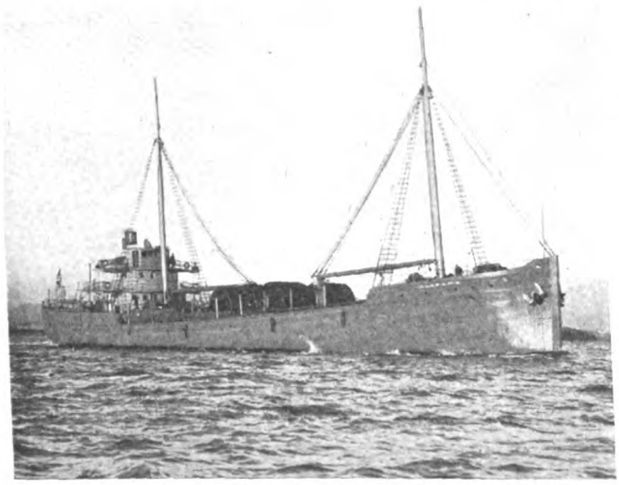


Fig. 4.—Motorship *Alabama* with Cargo of Boilers on Deck

points to float the boilers over rivers and across the southern part of Humbolt Bay to Eureka. Fig. 1 shows the boilers aboard the barge being towed across Humbolt Bay. On reaching Eureka, the boilers were rolled off the barge onto the pier and later loaded onto the *Alabama* by means of the special equipment shown in Figs. 2 and 3.

Explosion in Boiler Furnace on Destroyer

An explosion in the furnace of one of the boilers of the United States destroyer *Aaron Ward* occurred at the Navy Yard, Boston, Mass., on April 28. The boiler was of the Normand type, built by the Bath Iron Works, Ltd., and was being operated at the time, for port use only, with a steam atomized auxiliary burner. The fireroom was open and no blower was in use.

The fireman on watch either put out this burner or allowed it to go out, and then attempted to light it again from the brick work. This attempt failed, and was followed by the use of a torch, causing an explosion of the air vapor that had quickly accumulated in the furnace after the first attempt to light off from the hot brick work. No effort was made to clear the furnace with steam, as should have been done in accordance with instructions which had been issued.

The force of the explosion was such as to blow out the casing of the boiler on the front and sides, causing minor damage in the fireroom. Both firemen on watch were badly burned about the face and arms by the flareback.

Welding a Broken Stern Frame

WHEN the huge 526-foot army transport *Northern Pacific* ran aground in a dense fog only 300 yards from shore, off Fire Island, Long Island, N. Y., on January 2, 1919, the daily newspapers were filled with vivid accounts of the thrilling rescues by breeches buoy of her 3,000 passengers, including many wounded soldiers, the overturning of her lifeboats, and finally the successful efforts, although not until over two weeks later, of a fleet of tug boats in easing the steamship off the sand shoal and towing her to New York.

When the vessel was placed in a dry dock at the New York Navy Yard, Brooklyn, N. Y., it was found that her interior machinery was badly disabled, and her turbines were thrown out of alinement. A great many of her plates were badly battered, and had to be replaced with new plates. In addition to this, the problem arose as to what should be done with her 26½-ton cast steel stern frame, for just above the upper gudgeon the whole section of the stern frame was cracked through. The cross section of the break formed roughly a triangle, each side of which was about 2 feet in length. A view of the broken stern frame is shown in one of the illustrations.

Injury to Stern Frame

The high position of the stern frame break, because of the unusual circumstances which caused it, was unique in the history of stern injuries, most of which have occurred

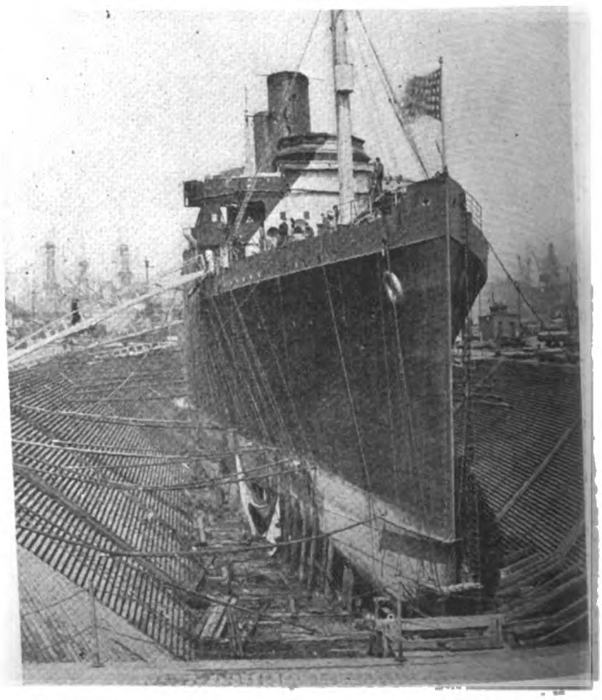


Fig. 1.—Transport *Northern Pacific* in Dry Dock at New York Navy Yard for Repairs

Generated on 2024-09-12 08:25 GMT / https://hdl.handle.net/2027/uiug.30112004006158
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Fig. 2.—Close-Up View of Break in Stern Frame

Fig. 3.—Cutting Out a 3-Inch Gap for Thermit to Enter

Fig. 4.—Wax Pattern Completed, Previous to Building Mold

much lower on the steel frame, or on the stern shoe near its junction with the ship. The welding of this fracture also offered a special problem because the crack occurred in a hollow part of the casting, just above a solid heavy portion. The wall of the casting at the break averaged about 3 inches in thickness. The location of the break left the lower portion of the casting supported solely by a comparatively slender horizontal stern shoe, which must have borne a terrific strain during the ship's rough treatment when she was grounded. To alleviate this strain, after arrival in dry dock, the stern shoe was blocked up from underneath and a wooden beam inserted in the propeller aperture, acting as a brace against the stern frame.

In handling this injury a mechanical repair was considered out of the question, and there remained only the alternatives of welding the parts together, or of purchasing a new casting and installing it at a cost probably exceeding $50,000 (£10,250). Although the fracture was larger than any marine weld ever made before, the fundamental difficulties were not greater than those of many repairs of considerably larger size which are constantly being made by thermit process of welding in the steel mills. This process, therefore, was finally chosen.

One of the first factors in making this repair was that of overcoming the problem of inaccessibility. As the stern frame work was in an overhanging place about 20 feet above the floor of the dry dock, it was first necessary to construct a substantial scaffolding to provide a steady support for a mold box. Having erected suitable scaffolding, the next step was to provide a space for the thermit steel to enter in bulk and form a perfect amalgamation with the broken parts. This was accomplished by cutting out a 3-inch gap at the break with an oxy-acetylene torch. Careful measurements indicated that the two parts had already separated a sufficient amount to make up for the contraction of the weld as closely as that contraction could be estimated in advance.

Applying the Wax Pattern

In order to reach the hollow interior of the casting, for the purpose of applying wax for the inside part of the wax pattern and for building up the inside of the mold, it was necessary to cut about 4 square feet of plate out of the ship's inner hull with an oxy-acetylene torch. As the rudder had been unshipped it was impossible to climb up from the scaffolding into a small chamber just above the hollow space of the stern frame by way of the round hole, about 2 feet in diameter, of the rudder stock stuffing box.

After applying yellow wax to the inside of the broken

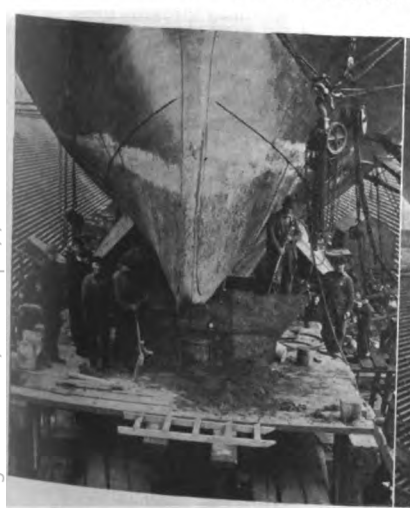


Fig. 5.—Ramming the Mold Box

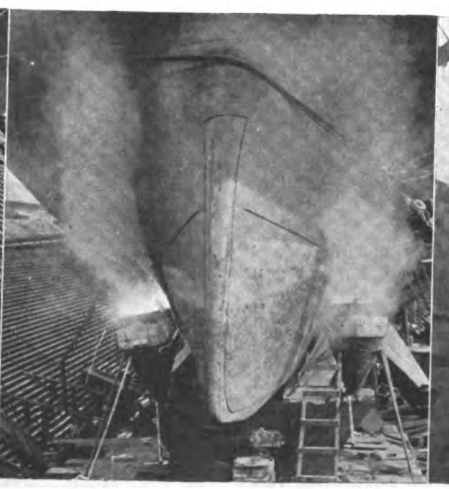


Fig. 6.—The Thermit Reactions

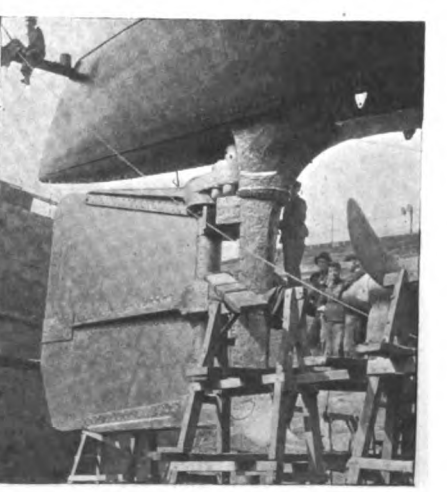


Fig. 7.—Completed Thermit Weld

Generated on 2024-09-12 08:02 GMT / https://hdl.handle.net/2027/uiug.30112004006158
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

section and placing a layer of wax on the floor of the hollow casting, molding material was deposited inside the casting and rammed up with a pneumatic rammer to a depth of 24 inches. Provision was made against the falling down of the molding material after the wax had burned out by inserting against the inside wall of the casting 5/8-inch iron gaggers bent inward at right angles to support the mold. The facing material placed adjacent to the wax consisted of one part fire clay, one part ground fire brick and one part fire sand. A wooden cylindrical riser pattern was vertically connected with the wax on the floor of the casting.

The interior of the casting having been rammed up, wax was next applied to the outside of the cut-out gap. A wax pattern was formed, varying from about 1½ to 2 feet in width, and bent upward on each side of the triangular casting at points where contact with risers was later to be made. Sixty-seven pounds of wax were required altogether for the wax pattern.

Constructing and Ramming Up the Mold

On completion of the wax pattern, a mold box was next constructed by cutting out the desired sizes of sheet iron with an oxy-acetylene flame, and bolting them into position. The finished mold box, with its base resting on the platform, had a rectangular, trough-like shape, as shown in the accompanying illustration, and measured 48 inches high, 51 inches on the sides parallel with the ship, 54 inches wide at the base and 10 inches wide on top.

In ramming up the mold box, the total quantity of molding material used amounted to 40 barrels of backing material and 6 barrels of facing material.

Insertion of Patterns

Heating gates were provided by inserting cylindrical wooden patterns through the bottom of the box on both sides and in the rear of the weld. Pouring gate patterns were connected diagonally downward through the top of the mold with the wax pattern. For outside riser patterns, a small narrow piece of a wooden plank was inserted close against each side of the triangular stern frame section and connected with the wax pattern below. These outside risers served the special purpose of applying molten metal for the thermit collar during cooling shrinkage, and thus prevented the thin casting shell at this point from sloughing away. All wooden and pipe patterns were removed before preheating.

Suspending Crucibles in Position

The suspension of the two No. 10 automatic crucibles with their extension rings over the mold box was accomplished by removing a rivet from the hull of the ship on each side at about 10 feet above the top of the mold box, and inserting eye bolts in these holes, from which chain hoists suspended the crucibles, as shown in Fig. 6.

The crucibles were held in place by removing two additional rivets, about 2½ feet apart, from each side of the ship at the height of the crucibles and lashing the crucibles against the hull by means of steel wire cables fastened around the crucibles and run through the rivet holes into the ship, where they were tied. The base of each crucible was rested on two angle iron rails laid across the top of the mold box. Each crucible was steadied by iron pipes braced between the crucible and platform. When in place each crucible was filled with 700 pounds of thermit, making altogether 1,400 pounds. Bricks were lined around the crucible extension rings.

As extra heat and fire precautions, asbestos was wrapped around the chains holding the crucibles, and asbestos sheets placed between each crucible and the hull of the ship. Molding sand was scattered over the platform to prevent its catching fire.

Preheating the Mold

At 8:15 A. M. on the day of the reaction, the operation of preheating the mold was started. The object of preheating was for the purpose of drying out the mold, burning out the wax pattern and for heating up parts of the steel at the location of and adjacent to the weld in order to secure a uniform contraction on cooling. Two gasoline (petrol) and compressed air preheating torches were directed through the sides of the mold box, a third down through the riser opening in the interior of the casting.

The preheating was kept up steadily for 7 hours. By 3:15 P. M. the broken sections had developed a very bright heat. Pressure was then turned off and the heating gates on the sides of the mold plugged up with clay.

The Reaction

As the time approached for setting off the reaction, the impending "fireworks" attracted the attention of several hundred naval officers, sailors and civilian employees, and the steps at the end of the drydock served as a great amphitheatre for the audience.

Both crucible reactions were set off simultaneously by stationing a man on a ladder at each crucible. At 3:30 P. M., on a signal, each man ignited with a red-hot rod the teaspoonful of ignition powder which lay on top of the thermit; then as the reaction started, jumped down and retired to a safe distance.

About 45 seconds were allowed for the liquid thermit steel to form from the reaction, after which time the two assistants tapped the crucibles by knocking out the tapping pins with long iron rods, thus allowing the molten steel to escape into the mold. The platform had been well sprinkled with sand and there was no danger from fire. The stray pieces of aluminum oxide slag were quickly covered with sand and rendered harmless.

The weld was allowed to anneal itself by cooling slowly, the mold box not being dismantled until the following day. When the molding material was finally cleared away, the risers and gates cut off with an oxy-acetylene torch and the weld examined by chipping off pieces of metal, the thermit steel was found to be a fine quality and appearance. The weld was then accepted by the Navy Yard representatives as being entirely satisfactory.

Time Consumed in Making Repair

The total number of 14 working days taken to complete the job does not by any means represent the average time consumed for making stern frame welds. The other repairs on the *Northern Pacific* had detained her for almost four months' confinement in dry dock; there was, therefore, no hurry on the stern frame weld. Furthermore, this repair required extra time in the unusual preparation of erecting a high scaffolding and platform, and in the delay occasioned in preparing the interior of the casting. Nevertheless, had the stern frame job required more of a rush, the total time consumed on the repair could doubtless have been cut in half.

Change of Name.—The American Engineering Standards Committee, New York, has just completed and adopted a revision of its constitution which has been sent to the governing boards of all the departments and societies represented on the Committee with a request for its ratification. The new constitution changes the name to American Engineering Standards Association, indicating the wide scope of the interests involved.

Generated on 2024-09-12 07:52 GMT / https://hdl.handle.net/2027/uiug.30112004006158
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Fig. 1.—Panoramic View of South Portland Yard, Cumberland Shipbuilding Company, Looking West

Cumberland Shipbuilding Company

New Yards Erected at Portland, Me., for Building Wood Ships, Installing Machinery, and Repairing Both Wood and Steel Vessels

IN April, 1917, a number of business men in Portland, Me., were approached by agents of the United States Shipping Board to make a thorough investigation of the working conditions of the wooden shipyards in the State of Maine. This preliminary work was undertaken in conjunction with The Moulton Engineering Corporation, of Portland, with the result that it was found that very few established yards cared to interest themselves in Government work. This finding necessitated the construction of the present plants of the Cumberland Shipbuilding Company, in order that Maine should live up to its traditions as the home of wooden shipbuilding.

Many sites were investigated, with a choice of the present location at Cushing's Point for the shipyard and marine railway; the "installation plant" being located at Ligonia, three miles away on the shore of Fore River. Both plants are served by the Boston & Maine Central railroads, with Cumberland County Power & Light Company electric engine service for points beyond.

The shipbuilding and repair plant lies just west of Fort Preble between two hills of ledges, on about 23 acres of low, marshy land, which had to be properly drained before filling. A sandy beach bounds the northeast side, upon which four complete pile and timber shipways were constructed, each pile being fully tested with a 20-ton weight to secure proper support for the keel blocks. The declivity of the beach is about 7/16 inch to a foot; the shipways are at ¾ inch per foot, thus necessitating dredging a basin right across the whole space of the shipways to a mean depth of 10 feet at mean low water, which, with a mean high water of 9 feet, gives a total depth of water for launching of 19 feet. The waterfront is unrestricted by channels, sands or shoals, therefore launching stops or devices for checking are unnecessary.

Layout of Plant

The layout of the plant combines the latest and best features of the old and new yards constructing this type of ships, with a view to receiving, piling and milling lumber so that a continuous flow from the yard to the ships may obtain, with no retracing action. The system of wood fabrication was held to rigidly, which means that every part of the ships possible was either completed by machinery for the building platforms ready for placing or brought complete from outside sub-contractors in order that the old-fashioned hand hewing work would be reduced to a minimum. The working areas between hulls and shipways were completedly planked.

Ground was broken late in August, 1917, for the construction of the shipyard, with completion for keel-laying January 3, 1918. On August 16, 1917, a contract for nine "Ferris" type wooden hulls, of 3,500 tons deadweight each, complete with fittings, masts and rigging, was signed with the United States Shipping Board, Emergency Fleet Corporation. Through the non-delivery of material, considerable time was lost in the early days of the contract, but much of this handicap was soon overcome and the first ship, the *Cumberland*, was launched on June 29, 1918, in 135 actual working days.

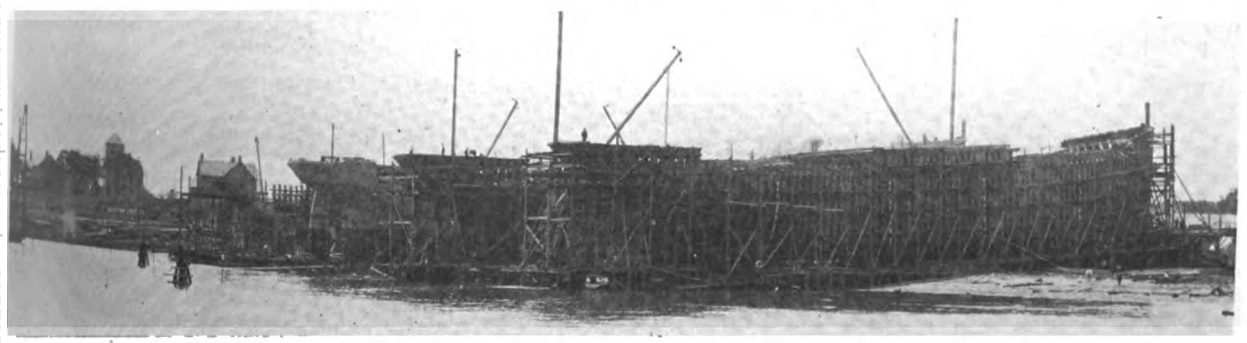


Fig. 2.—Building Slips on August 5, 1918, Showing Four Ways Fully Occupied

Generated on 2024-09-12 08:01 GMT / https://hdl.handle.net/2027/uiug.30112004006158
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

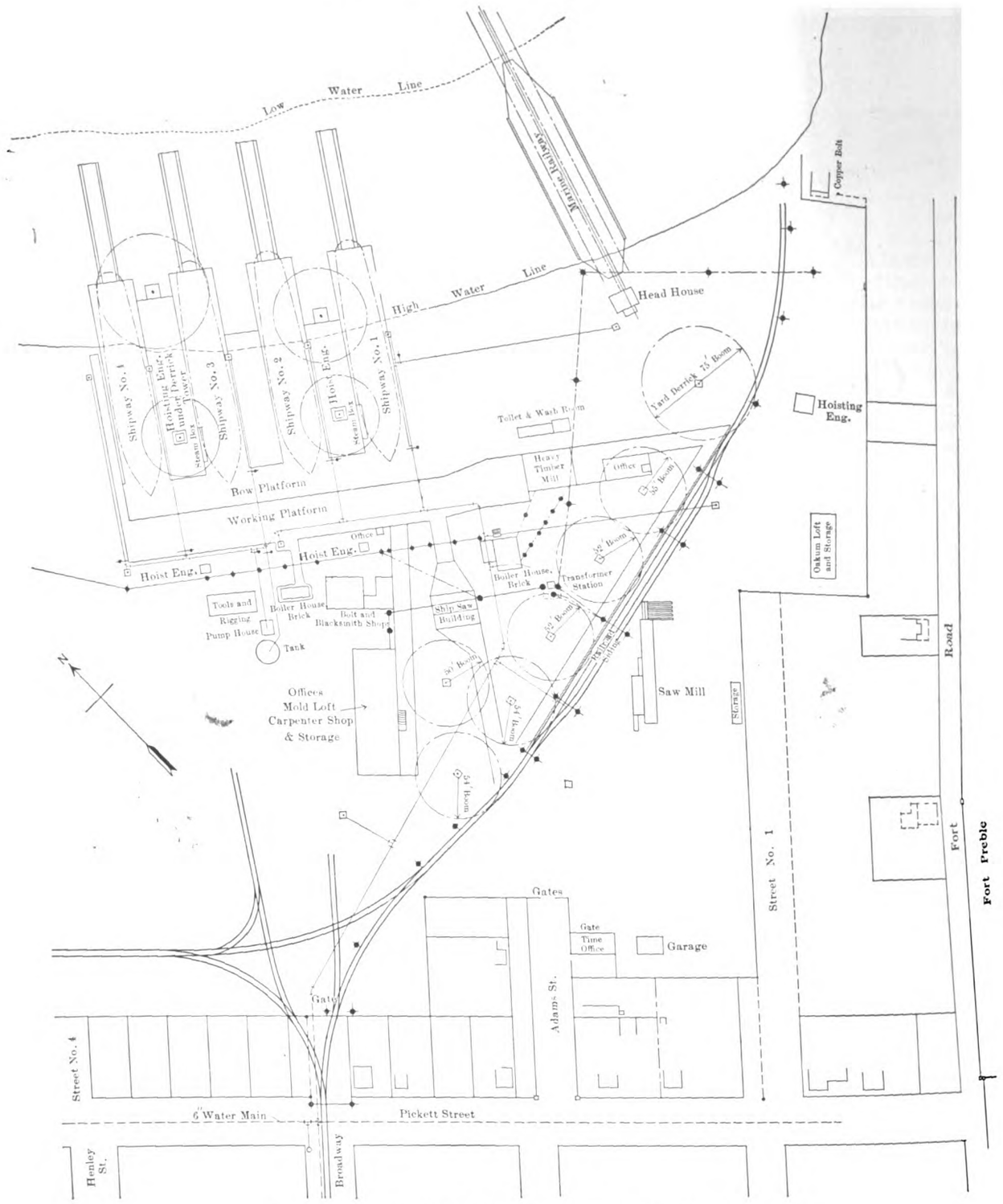


Fig. 3.—Plan of South Portland Yard, Cumberland Shipbuilding Company

Ten quarry-type wooden derricks, arranged as shown, were erected to care for the proper handling of material, with steam winches located at the bases for operating the hoists and bull-wheels. These derricks have proved very satisfactory for speedy operation.

Standard gage tracks serve a considerable portion of the yards.

SHIPWAYS

Four pile and timber shipways were installed to take vessels up to 300 feet in length by 50 feet in breadth. These ways are spaced 100 feet centers, which gives ample room between the ships for laying out necessary work and storage of material.

Each way is served by two steam operating derricks, mounted on high wood timber pedestals. Wire rope is used throughout for falls and guys.

PILING OF TIMBER

A complete layout, blueprinted for the lumber checkers and sorters, was prepared, giving unit marks, sizes and lengths for properly storing under the derricks and facing the railroad track each member of the ship, which was

Generated on 2024-09-12 08:07 GMT / https://hdl.handle.net/2027/uiug.30112004006158
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

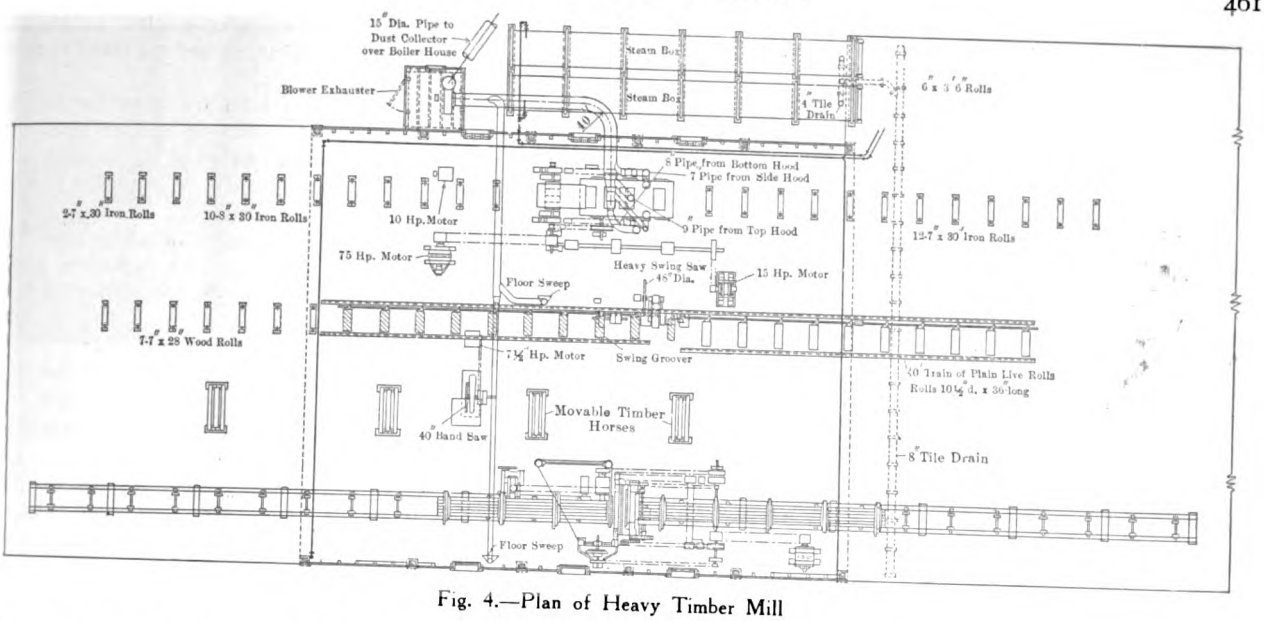

15" Dia. Pipe to Dust Collector over Boiler House
Blower Exhauster
Steam Box
Steam Box
4" Tile Drain
6" x 3' 6" Rolls
8 Pipe from Bottom Hood
7 Pipe from Side Hood
9 Pipe from Top Hood
2-7" x 30" Iron Rolls
10-8" x 30" Iron Rolls
10 Hp. Motor
75 Hp. Motor
Heavy Swing Saw 48" Dia.
15 Hp. Motor
Floor Sweep
12-7" x 30" Iron Rolls
7-7" x 28" Wood Rolls
7½ Hp. Motor
Swing Groover
10 Train of Plain Live Rolls Rolls 10½" d. x 30" long
Movable Timber Horses
40" Band Saw
8" Tile Drain
Floor Sweep

Fig. 4.—Plan of Heavy Timber Mill

found to be a wonderful time-saver and allowed systematic receiving for starting through the mills.

Saw-Mill

The saw-mill for splitting heavy logs and timber is 128 feet long by 16 feet wide, equipped with a No. 2 Lane, power-feed saw-mill, carrying a 60-inch circular saw. This machine is actuated by a 75-horsepower, 440-volt, 3-phase, 60-cycle motor.

In addition, a 30-inch circular cut-off swing saw, actuated by a 5-horsepower, 440-volt motor, is placed at the outer end of this mill for removing waste ends of timber.

The timber is hauled into the mill by a continuous chain drag, actuated by a gearing and clutches with the main motor.

Heavy Timber Mill

The timber is hauled into the mill by a continuous chain high, 60 feet by 60 feet, and is used for shaping, planing and surfacing lumber. Its equipment is strictly up-to-date, with a Stetson-Ross No. 11 machine complete, 20-inch side and 24-inch top heads, bevel planer which allows cutting timber to any angle. The heads are actuated by a 75-horsepower motor.

There is also a four-sided planer of 16-inch by 30-inch capacity, which in one operation surfaces neatly all sides of the timber. This machine is belted and independently driven by a 75-horsepower electric motor of 440 volts, alternating current. The equipment for this mill includes: One swing-cut-off saw of 48-inch diameter, No. 604 American; one swing groover, No. 2, B. G. Luther; one heavy 44-inch band saw; one set of power rolls for band and swing saws; two 15-horsepower motors for running these small machines.

Three overhead chain hoists on trolleys assist in handling the timber.

Ship Saw Mill

The ship saw mill is a one-story wood building, 54 feet by 24 feet, equipped with two power B-11 double bevel band saws having 38-inch diameter wheels. These machines are actuated by two 15-horsepower, 440-volt, 3-phase, 60-cycle, A. C. motors. There are also two self-contained swing cut-off saws with 10 horsepower motors and 40-inch circular saws.

The material is handled on portable roller horses, with two 3-ton chain hoists on trolleys overhead.

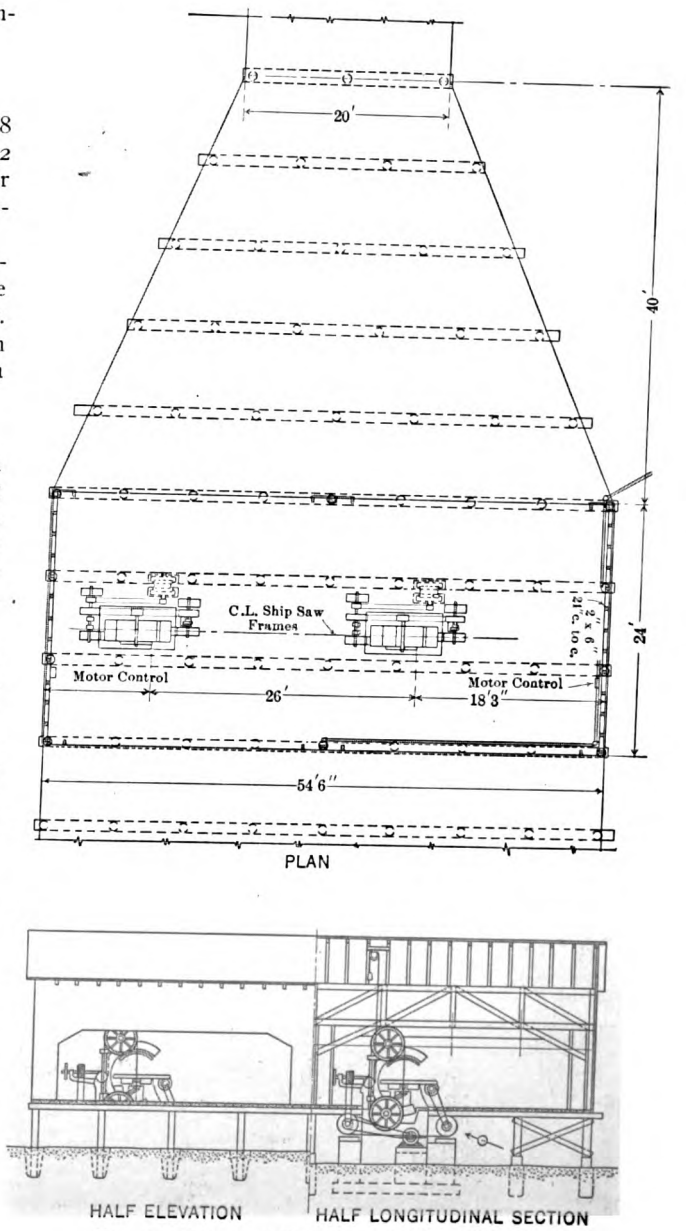


Fig. 5.—Plan and Elevations of Ship Saw Mill

Generated on 2024-09-12 09:04 GMT / https://hdl.handle.net/2027/uiug.30112004006158
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

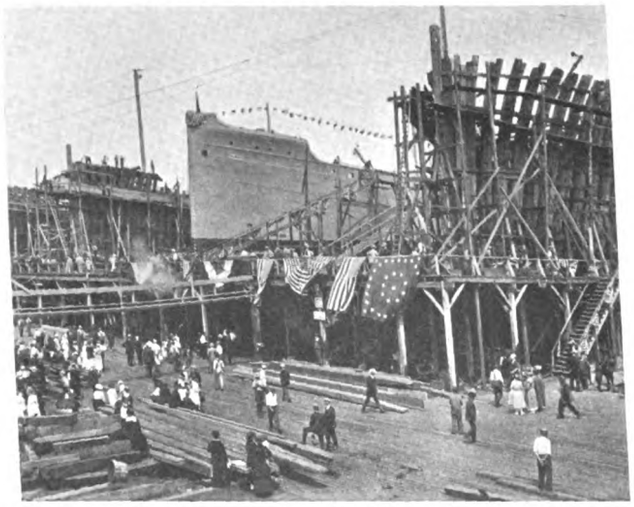


Fig. 6.—Just Prior to Launching Hull No. 383

This mill is used principally for cutting the main frames of the ships.

Exhaust System For Shavings

A complete electrically-operated fan with sheet iron ducts and a large collector tower, located over the No. 1 power house, handles all waste for the two last-mentioned mills to the boilers for fuel.

No. 1 Power House

No. 1 power house, a one-story brick building 41 feet by 29 feet, with annex 26 feet by 15 feet, contains a double unit arrangement for steam heating, and an air compressor fire pump and derrick winches, as follows:

Two 60-horsepower Nagle, locomotive-type boilers.

One horizontal feed-water heater.

One Blake & Knowles duplex feed-water pump, 4½ by 2¾ by 4 inches.

One water tank, 5 feet by 4 feet.

One Ingersoll-Sergeant steam air compressor, 16 inches by 18¼ inches by 18 inches, which delivers 600 cubic feet of air at 90 pounds working pressure.

One Sullivan angle air compressor, 17 inches by 9¾ inches by 12 inches, electric driven, giving 540 cubic feet per minute at 90 pounds working pressure. This machine is actuated by a 100-horsepower electric motor, with necessary switchboard, resistances and all other required fittings.

Two air receiving tanks of steel are located at the outside of this building, with banks of cooling pipes. Air mains of steel pipe lead to all parts of the working platforms, with hundreds of feet of ¾-inch rubber hose for connection to the tools.

"Little David" and "Little Giant" boring, calking, chipping and driving machines are used for expediting fastening, whereas grinding machines with 6-inch diameter saws attached are used for grooving the frames for the 4-inch by ½-inch iron strapping.

A No. 2 power house of brick, 35 feet by 15 feet, with concrete floor, contains one 60-horsepower Nagle locomotive-type boiler for assisting in supplying steam to the shipway derricks.

Main Building

The administration building is a two-story wooden building, 156 feet long by 52 feet wide, and contains the main offices, storerooms, junior shop, pipe shop and machine shop on the first floor, with engineering offices, cost department rooms, mold loft, rigging loft, saw filing department and social room for employes on the second floor.

The gate house and time office, a one-story wood building, stands guard at the main entrance to the yard, containing four main passageways with time clocks and card racks.

At the ends and between these passageways are located rooms for the purchasing agent, service manager, cost keepers, paymaster and guards.

Miscellaneous Buildings

The blacksmith and bolt shops, 40 feet by 24 feet and 16 feet by 16 feet, respectively, contain four forges, anvils, power hammer, motors, punches and shears, pneumatic bolt header, Hauck oil furnace, threading machines, Hill & Clark 24-inch drill press, rolls and trolleys.

The toolhouse, rigging loft and grindstone room are located in a one-story wood building, 25 feet by 60 feet. Here all air tools are properly cared for each night after the day's work.

Fire Protection System

A well-organized fire-fighting organization was built up,

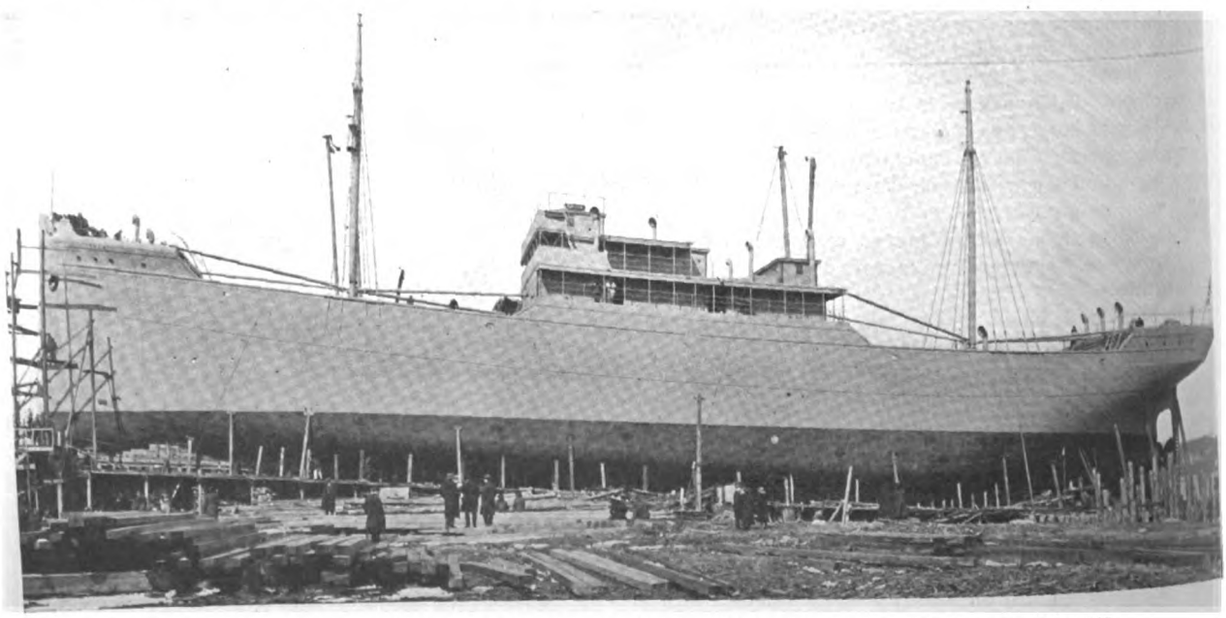


Fig. 7.—S. S. *Orhom* Nearing Completion on the Ways. This Vessel Was Launched on April 2, 1919

Generated on 2024-09-12 07:51 GMT / https://hdl.handle.net/2027/uiug.30112004006158
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

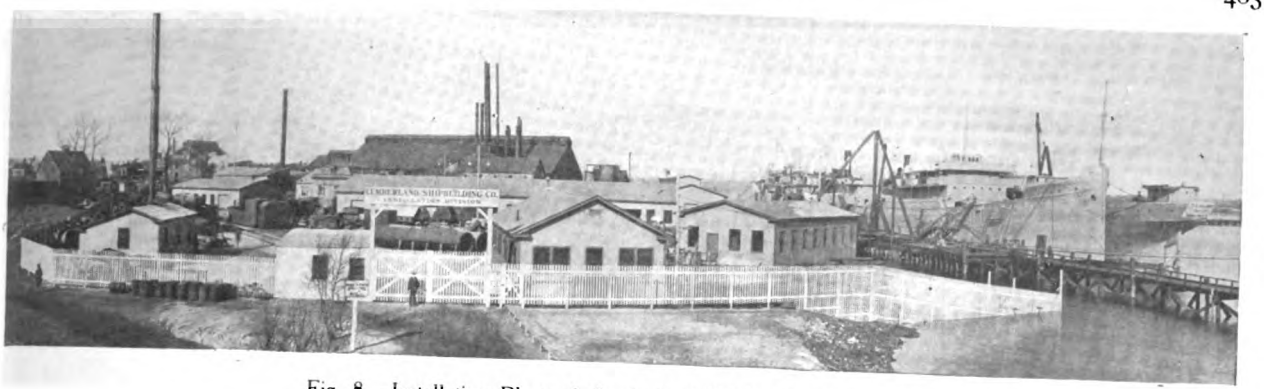


Fig. 8.—Installation Plant of Cumberland Shipbuilding Company

consisting of a marshal, assistant marshal, assistants and hose crews, which holds drills twice weekly. The yard is laid out into districts, each with its number, so that the steam whistle alarm tells the exact spot to seek when it is sounded.

A pump house of brick, one-story high, with a concrete and steel roof, contains a 1,000-gallon Worthington Underwriters' pump connected to the power house for steam, and a 107,000-gallon tank for water should the city water supply fail. A complete hydrant system, with proper pipe connections, is installed to span the whole working area of the yard, also 1,200 feet of 2½-inch fire hose in proper lengths is stored in hydrant houses.

Plant Training School

The management experienced considerable trouble during the early days of the contract owing to a lack of trained ship workers. To overcome this obstacle, house carpenters were employed, placed under competent foremen right on the job, and intensely trained into competent ship workers. Fasteners and calkers were trained in a similar manner.

Welfare Service and Employment Departments

A well-organized department, directed by trained service manager, cares for the health and recreation of the employes. Accurate card records are kept of each employe to allow placing to suit each individual.

A "first-aid" room, with full equipment, is provided, with a trained nurse and surgeon in constant attendance.

For recreation and amusement, a full-piece band and a glee club were formed to supply the plant with good music. Baseball teams and other athletic departments were organized. Public speakers have been invited to address the men at bi-monthly meetings to present the topics of the day to the employes at noon recess.

Records of accidents are published, which assists in reducing to a minimum lost time and carelessness.

This department is very much alive and does everything possible to keep the employes interested, which causes them to feel that the executives are with them and they are part of the plant. Foremen's meetings are held regularly to discuss plans for improving the efficiency of the plant, with splendid success.

Record Construction

In attempting speed records, one "Ferris" type wooden

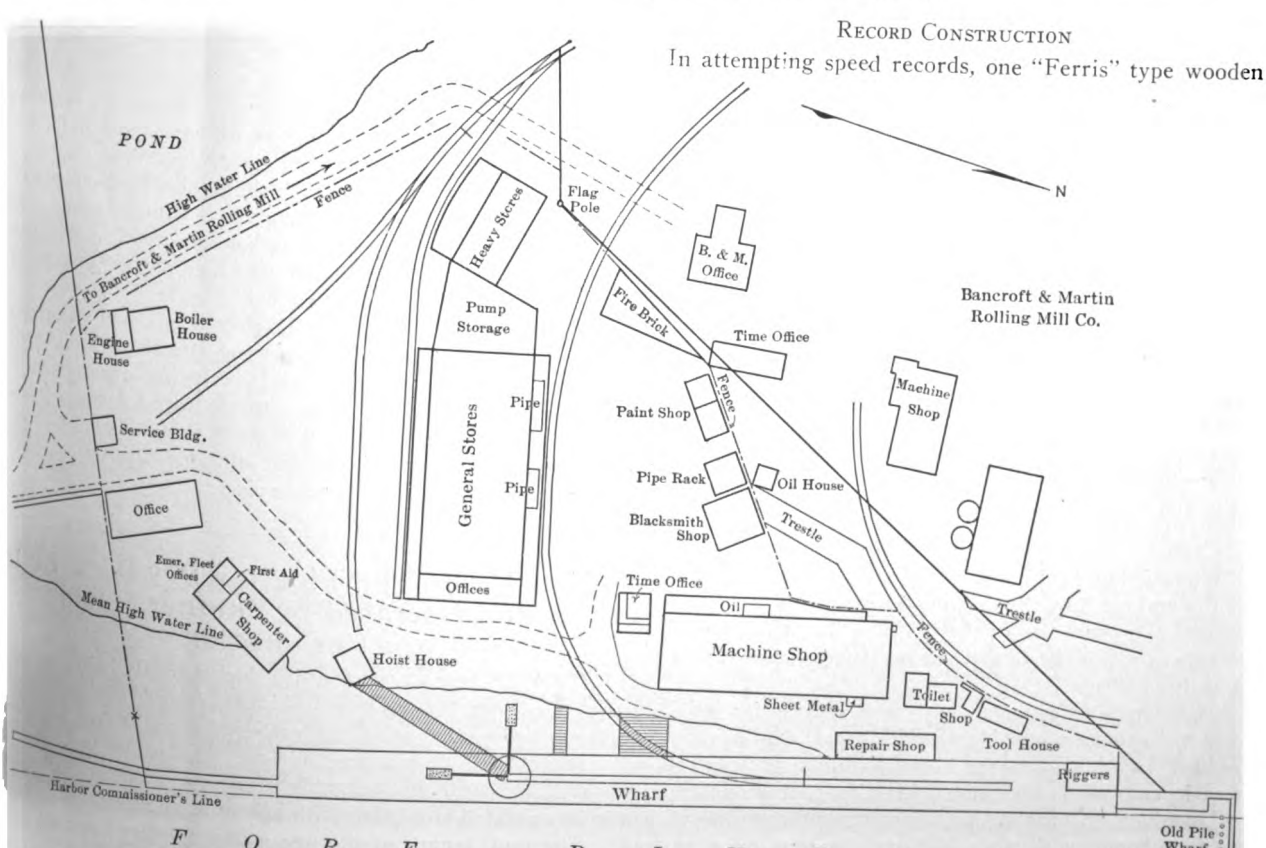


Fig. 9.—Plan of Installation Plant

Generated on 2024-09-12 08:06 GMT / https://hdl.handle.net/2027/uiug.30112004006158
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

ship was built in 135 working days. Another ship was fully square framed, set and ribbanded in 34 working hours.

LABOR-SAVING DEVICES

Many labor-saving devices were invented and used by the Cumberland organization. A port cutting machine for holes for air ports and a grab handle hole machine for hatch covers are worthy of special mention.

Compressed air machines are used throughout, replacing hand hammer and maul work.

THE INSTALLATION PLANT

A fully-equipped plant for installing machinery in the finished hulls was constructed and opened for work in July, 1918, with a contract with the Emergency Fleet Corporation for ten ships. This was later increased to 20 ships.

This plant is located in what is called the back river arm of Portland harbor, and is above three bridges, namely, the South Portland bridge, the first Boston & Maine railroad bridge and the Vaughan street bridge. It is just below the second and main line Boston & Maine railroad bridge. The water area between the Vaughan street bridge and the main line Boston & Maine railroad bridge is approximately 1,000 feet between bridges, with a full depth channel of approximately 500 feet in width at low tide from the face of the pier.

The depth of the water from the face of the dock across the entire width of the channel is approximately 17 feet at mean low water. The working wharf is about 500 feet long, with two wings approximately 200 feet additional to the dolphins set for a ranging line for ships tied up at the working dock. The location is well sheltered.

There is no undertow at any time, and the tide current is very slow, making it an ideal spot to moor ships during the worst weather conditions. The shops, storehouses and yards are located on a piece of property adjacent to the Bancroft & Martin Rolling Mills Company, embracing approximately 5 acres. It is completely fenced in and made up of a fill of rolling mill slag and gravel. The nature of this fill prevents the formation of mud, and the yard is practically as dry following a hard rain as at any other time.

There are ample trackage facilities, as will be observed by reference to the plan, throughout the yard and on the wharf. The buildings are of substantial mill type. For fire protection, a White gasoline (petrol) pumping engine, with chemical attachment, is provided, together with ample hose to put several lines in commission at any time in any part of the plant. Its location in Portland, adjacent to the rolling mills above mentioned, is an ideal one from the standpoint of material and supplies.

The plant is steam heated throughout, from a central boiler plant located within the yard. The electric cars pass over Vaughan street bridge, providing ample service to the city, and stop within a stone's throw of the gate.

FITTING OUT BERTHS

There is one fitting out wharf 500 feet long, with space at the end to allow the docking of two ships 300 feet long. Due to the character of the basin, it has been possible to handle as many as five ships at one time, placing them two and three abreast.

The wharf is equipped with a stiff-legged derrick, of 30 tons' capacity, capable of lifting 15 tons on a 50-foot radius. In addition to the above lifting rig, the plant has two locomotive cranes, one with a 60-foot boom, capable of handling 30 tons on a 12-foot radius, and one with a 30-foot boom, with a capacity of 12 tons on a 14-foot radius. The tracks are extended down the wharf, enabling the locomotive cranes to serve the ships that cannot be reached by the stiff-leg derrick.

MOTIVE POWER

Electricity is used exclusively, except on the hoisting apparatus mentioned above, which is run by steam. The equipment consists of four 10 horsepower 220-volt motors, for the running of all machine tools in the various shops, and in addition to this, one 100-horsepower 2,300-volt motor, driving the air compressor, which has a capacity of 709 cubic feet.

The air compressor is a Sullivan machine, with high and low presure cylinders, at right angles to each other. A pipe system is led from the compressor plant, furnishing air to the machine shop, pipe shop and copper shop, and also to a pipe line along the wharf for use on shipboard.

MACHINE SHOP

A complete equipment of machine and hand tools is installed in the machine shop, making it possible to perform any kind of repair work on a ship, except the very largest parts, such as propeller shafting, main engine cylinders and the like. The largest lathe is a 24-inch by 14-inch Round-Larmon. By means of blocks under the head and tail stocks, this lathe has been changed so as to take a 30-inch swing over the bed.

This plant is well equipped with air tools for work on the ships, and, in addition, several riveting hammers, as well as bolt drivers, air-driven, are installed. There are two oxy-acetylene torches, one large Oxweld outfit, and a smaller Waterhouse welding outfit.

BLACKSMITH SHOP

The blacksmith shop is located in a separate building, and is equipped with five forges with individual electric-driven blowers, anvils and all necessary hand tools for every forge.

PIPE SHOP

The pipe shop is equipped with two pipe threading machines, capacity up to 6-inch pipe, one bending slab and two Hauck oil torches for heating of pieces for bending. The shop is also fully equipped with hand tools of various kinds, such as pipe expanders, stocks and dies, etc.

In connection with the pipe shop, there is also a copper shop, equipped with two charcoal burning furnaces, as well as Hauck torches for auxiliary heating. In this shop is a press with the assistance of which copper pipes up to 7 inches in diameter are handled.

The yard also has a force of electricians, with the necessary tools for doing all kinds of electrical work on board ship, a paint department and a rigging department of heavy machinery, and also experts in the rigging of vessels, standing rigging as well as running.

The two plants furnish facilities for turning out complete ships, ready for sea service.

New 15,000-Ton Floating Dry Dock Built and Operated by Skinner & Eddy Corporation

THE new 15,000-ton dry dock recently built and now operated by the Skinner & Eddy Corporation, Seattle, Wash., is of the sectional type, having five pontoons, each 90 feet long by 126 feet 8 inches in width.

Each pontoon is capable of lifting 3,000 tons, and can be operated singly, or with others in any number of units. The total length of the five pontoons when operated as a

Generated on 2024-09-12 07:50 GMT / https://hdl.handle.net/2027/uiug.30112004006158
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

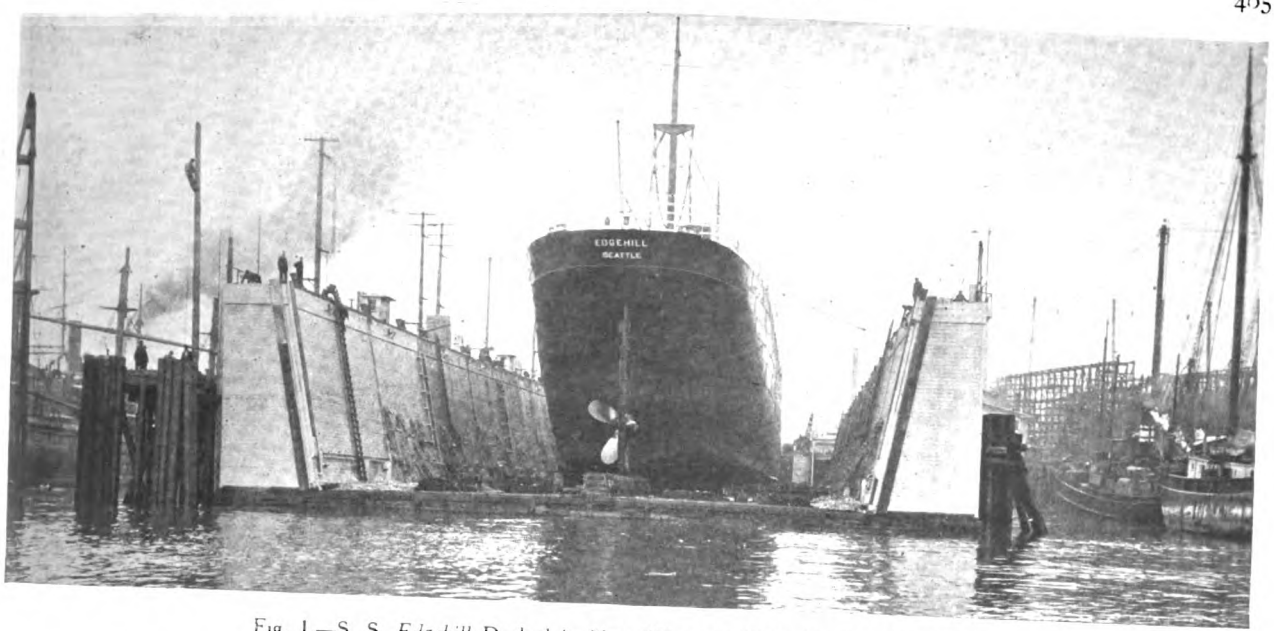


Fig. 1.—S. S. *Edgehill* Docked in New Skinner & Eddy Floating Dry Dock

unit is 459 feet, with a depth of water over the keel blocks of 25 feet.

The dimensions of the pontoons have been so arranged that any one pontoon in need of repair may be docked within another. When operating as a unit, the pontoons are connected together by locking logs, which serve to tie the pontoons together and keep them in alinement.

PUMPING MACHINERY

Each pontoon is divided with two 20-inch vertical shaft centrifugal pumps manufactured by the Morris Machine Works, Baldwinsville, N. Y., located low-down in the pontoon, one on each side under the towers. From each pump branch pipes 14 inches in diameter are led to each of the three watertight compartments on that side of the pontoon, each pipe being controlled by a gate valve operated from the top of the tower. A foot valve is fitted at each of the suctions.

Each watertight compartment is provided with an 18-inch flooding pipe which allows water from the outside to enter, and this water is controlled by a gate valve operated from an indicating stand on the top of the tower. This

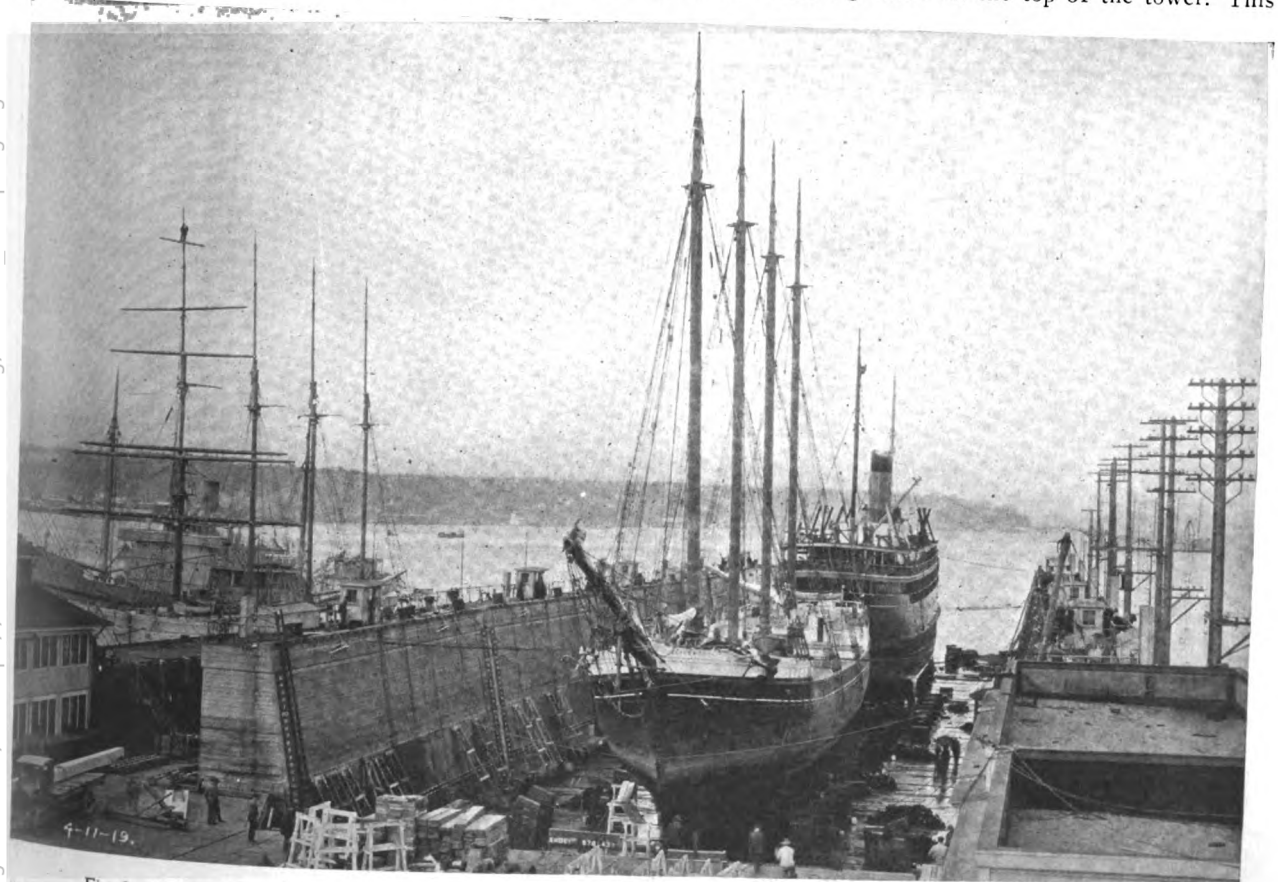


Fig. 2.—View of Skinner & Eddy Dry Dock from Shore, Showing Schooner and Steamship in Dock at Same Time

Generated on 2024-09-12 08:00 GMT / https://hdl.handle.net/2027/uiug.30112004006158
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

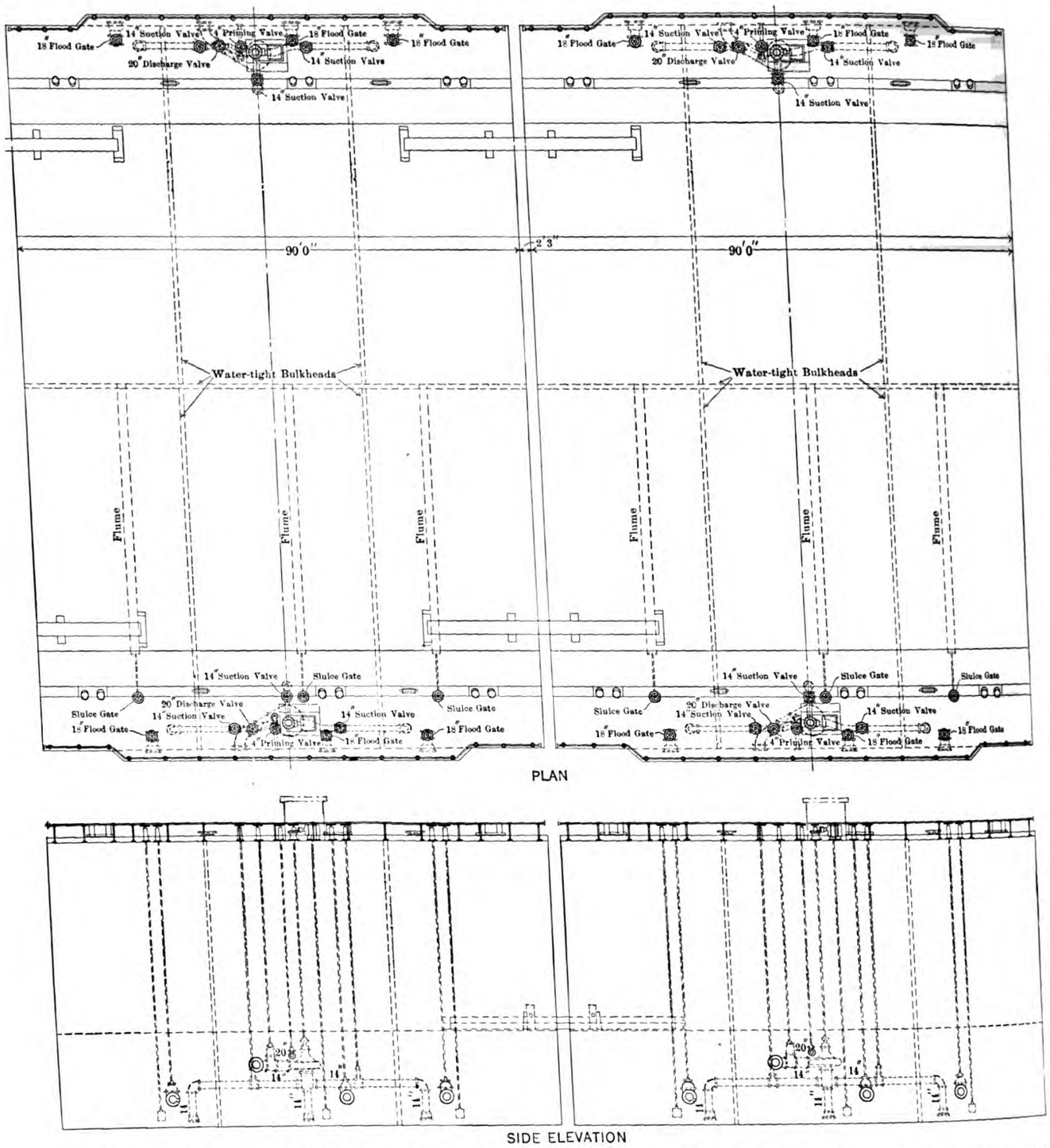


Fig. 3.—Plan and Elevation of Two Sections of Skinner & Eddy Dock, Showing Method of Locking Sections Together and Arrangement of Pumps

combination of pumping pipes and valves gives a very accurate control over the trim of the dock. The vertical shaft from each pump leads to the top of the tower, where it is driven by a 100-horsepower, 2,200-volt motor, the pump running at 300 revolutions per minute.

All motors are controlled from a central station placed on the wharf at the head of the dry dock. In this station are indicators showing the depth of water in each compartment of each pontoon, so that the operator has complete control of the raising and lowering of the dock.

There are three 2,500-horsepower electric capstans on each side of the dry dock mounted on top of the tower. These capstans were manufactured by the American Engineering Company, Philadelphia, Pa., and are used for hauling ships into the dock and placing them in position ready for lifting.

Audible Electric Signals in Industrial Plants*

BY V. KARAPETOFF†

No industrial plant of any magnitude may be considered fully efficient unless means are provided for promptly locating any important employee, no matter where he may be within the plant. A private telephone system, however extensive, serves this purpose only as long as the needed man is at his desk, but as soon as he leaves his desk the problem of locating him becomes a hit or miss proposition. On the other hand a superintendent, a foreman, a millright, a repair man, etc., is ordinarily

* Extract from a paper presented before the Rochester, N. Y., Secti of the American Institute of Electrical Engineers on April 25, 1919, a before the Erie, Pa., Section on May 13, 1919.

† Professor of Electrical Engineering, Cornell University, Ithaca, N. Y

Generated on 2024-09-12 08:06 GMT / https://hdl.handle.net/2027/uiug.30112004006158
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

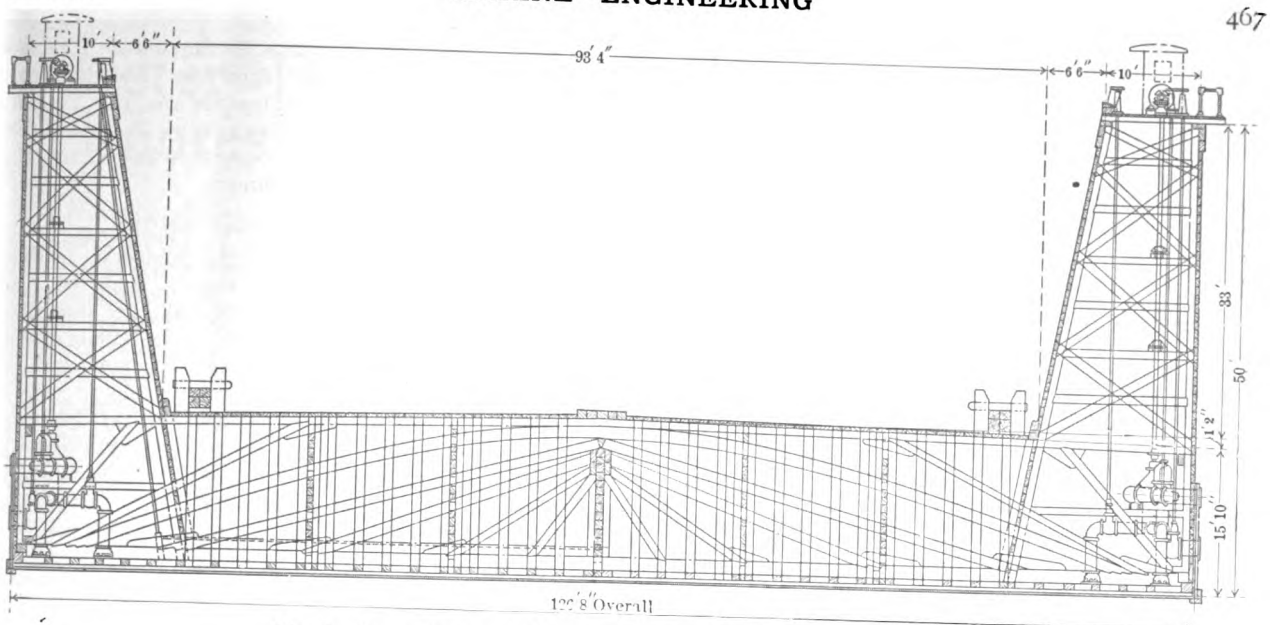


Fig. 4.—Cross Section of Skinner & Eddy Sectional Floating Dry Dock

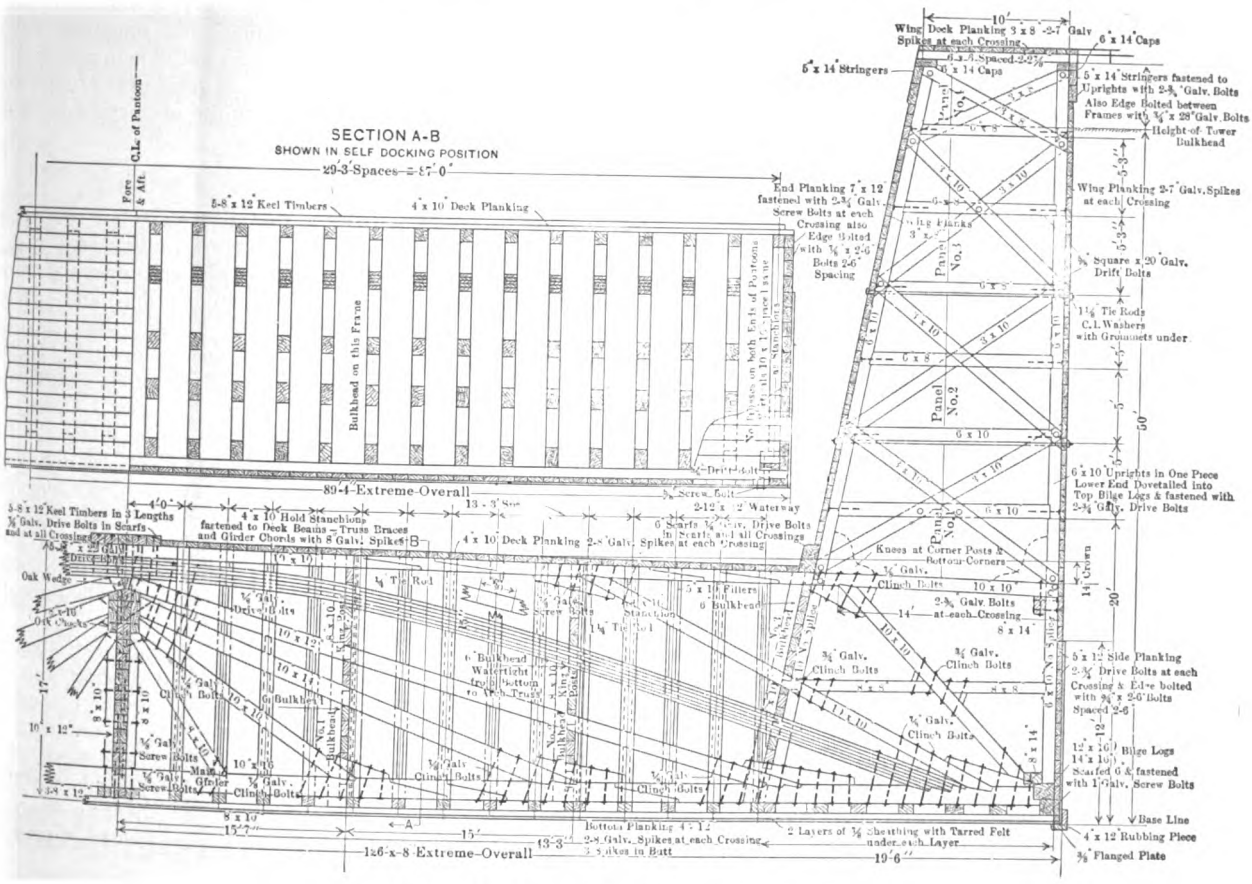

SECTION A-B
SHOWN IN SELF DOCKING POSITION
29-3 Spaces = 87'0"
Bulkhead on this Frame
89-4 Extreme Overall
4 x 10 Deck Planking
4 x 10 Hold Stanchions
4 x 10 Deck Planking
Wing Deck Planking 3 x 8 -2-7 Galv.
6 x 14 Caps
5 x 14 Stringers
Also Edge Bolted between Frames with ¾" x 28" Galv. Bolts
Height of Tower Bulkhead
Wing Planking 2-7 Galv. Spikes at each Crossing
¾" Square x 20" Galv. Drift Bolts
1⅛" Tie Rods C.I. Washers with Grommets under
6 x 10 Uprights in One Piece
Lower End Dovetailed into Top Bilge Logs & fastened with 2-¾" Galv. Drive Bolts
5 x 12 Side Planking
2-¾" Drive Bolts at each Crossing & Edge bolted with ¾" x 2'6" Bolts Spaced 2'6"
12" x 16" Bilge Logs 14" x 16"
Scarfed 6'6" fastened with 1" Galv. Screw Bolts
Base Line
4 x 12 Rubbing Piece
⅜" Flanged Plate
Bottom Planking 4" x 12"
2 Layers of ¼" Sheathing with Tarred Felt under each Layer
126'-8" Extreme Overall
19'6"

Fig. 5.—Midship Section of Dock, Showing Scantlings

useful only in so far as he can freely move about the shop without the fear that someone of importance may need him. Thus, within the last few years, under the tremendous impetus of the pressure for an enormous increase in the production of munitions of war, audible electric signals have been introduced into many industrial plants.

Such an electric signal is usually similar in construction to the familiar electric "horn" used on automobiles. It consists of a diaphram with an anvil at its center. A toothed wheel driven by a small electric motor strikes the anvil many times a second and causes it to vibrate vigorously. These vibrations produce the well-known warning tone, which carries over a considerable distance. The device is provided with a projector or horn the shape of which depends on whether it is desired to scatter the sound, to intensify it in a horizontal direction, or to deflect it downward. Such motor-driven signals are now made much more powerful than automobile horns, and are wound for 110 or 220 volts, direct or alternating current,

Generated on 2024-09-12 07:48 GMT / https://hdl.handle.net/2027/uiug.30112004006158
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

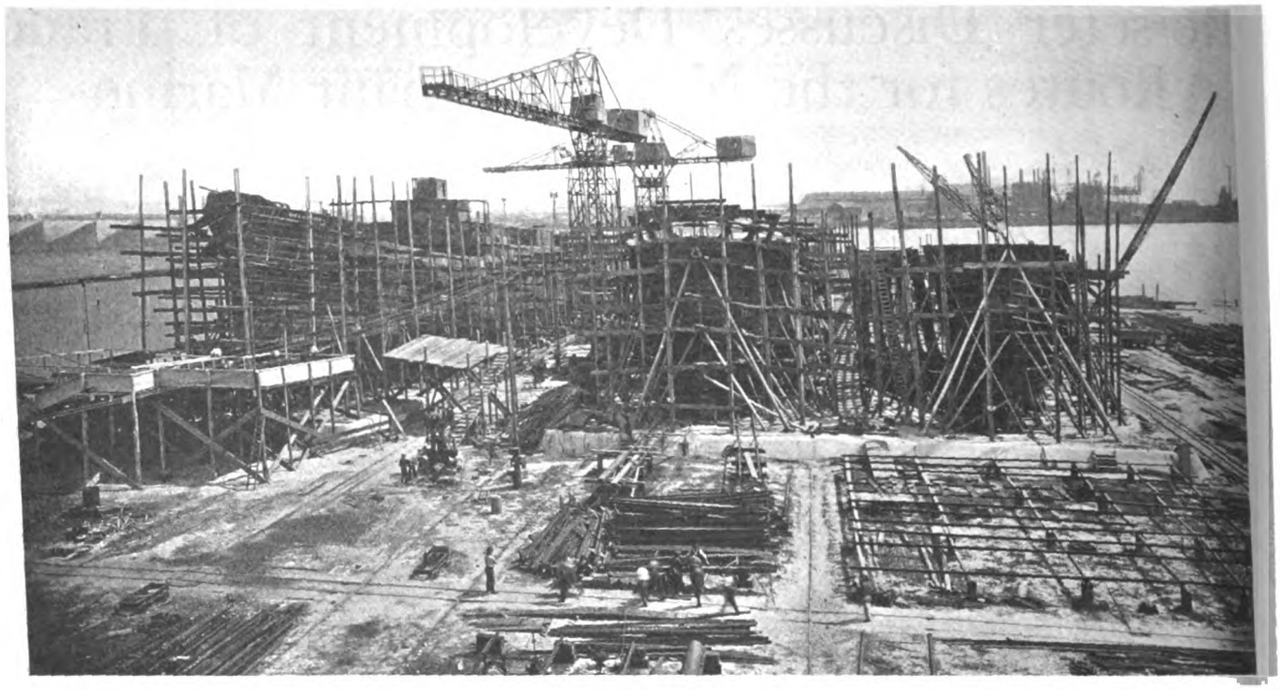


Fig. 1.—State Government Dockyard, Walsh Island, Newcastle, N. S. W. Building Ways Showing Three of the Australian Standard Ships Under Construction

Shipbuilding in Australia

Government Dockyards at Newcastle and Sydney Turn Out Cargo Vessels and Trawlers—Repair Facilities

DURING the past few months, the Commonwealth of Australia has completed the first serious attempts at ship construction in her history, and from the success of her efforts it is believed possible to supply, with present equipment, all necessary naval auxiliaries, cargo and coasting vessels required by the Commonwealth.

Two Government dockyards, one at Walsh Island, Newcastle, and another at Sydney, have accomplished very favorable results in connection with this construction. At present there are five 5,500-deadweight ton cargo ships in various stages of completion on the ways at Newcastle, while another ship of the same type was launched on March 25, 1919.

The Newcastle yard is on a small island, which is ideal for the work, because of its natural sand foundation, the possibility of expansion by the reclamation of land from the river and its accessibility to the Broken Hill Proprietary Company's works, which is the only plant in Australia at present equipped to roll ship plates. Newcastle is surrounded by coal fields, making power in this section cheaper than practically anywhere else in Australia. The yard was originally intended for Government work, but the management has been given power to make contracts with private firms, so that equipment might be efficiently utilized.

The Honorable R. T. Ball, Minister of Works of New South Wales, is chairman of the Board of Control, and has a very able engineering staff to assist in carrying out

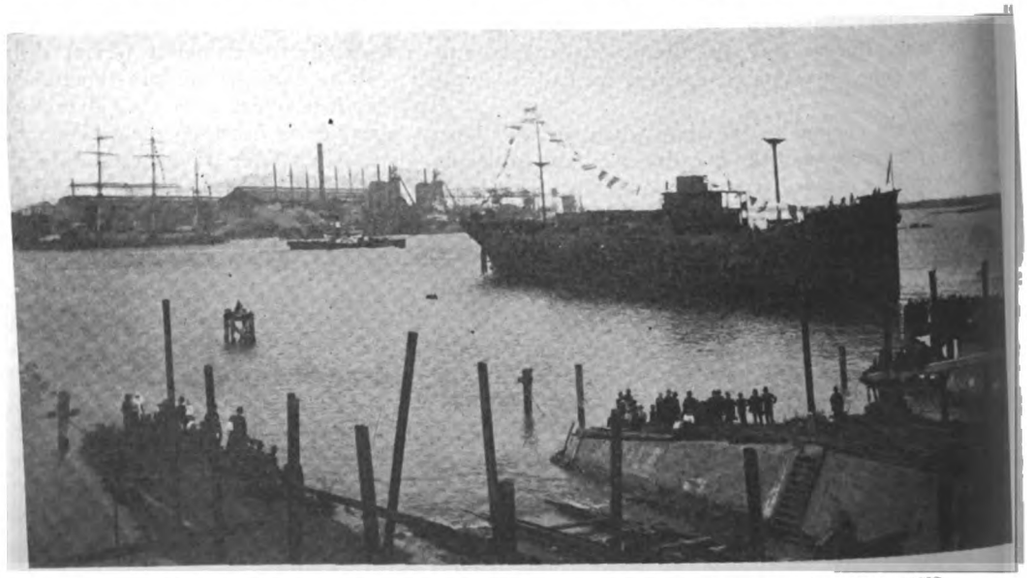


Fig. 2.—S. S. *Delungra* Taking the Water. Launched at Newcastle, March 25, 1919

Generated on 2024-09-12 07:51 GMT / https://hdl.handle.net/2027/uiug.30112004006158
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Bridge
Poop & Forecastle

to Port

ket

n)

sen Angles

ıter Strake .46" to .38"
also Keel &
er Plan)

6" x 6" x .69" Single
3½" x 3½" x .50" Double in
3½" x 3½" x .44" Double Ford.
48' - .38" (Rule 40)
Double 6" x 6" x 7/16" } 6" x 6" x 9/16" under Rollers
Single 6" x 6" x 7/16" }
Single 6" x 6" x .50"
Double 3½" x 3½" x .60" in
r, Ford. of 3/3 l.

ated horsepower
ock & Wilcox
;

ical stern. She
all cabins are
stralian timber,
rosewood. Of-
the master and
vigating bridge
op. The ship's
n a store room
ements are very
ully loaded, the

n steel derricks
derrick is pro-
main mast also
is well equipped

Generated on 2024-09-12 09:00 GMT / https://hdl.handle.net/2027/uiug.30112004006158
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Fig. 1.—State Go

DURING the
Australia h
ship construction
her efforts it is
equipment, all r
coasting vessels r

Two Governm
Newcastle, and
very favorable re
At present there
ships in variou
stages of compl
tion on the wa
at Newcastle, whi
another ship
the same type w
launched on Marc
25, 1919.

The Newcastl
yard is on a sma
island, which
ideal for the wor
because of its na
ural sand found
tion, the possibili
of expansion
the reclamation
land from the riv
and its accessibili
to the Broken H
Proprietary Con
pany's works, whic
is the only plan

Generated on 2024-09-12 07:52 GMT / https://hdl.handle.net/2027/uiug.30112004006158
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google

Digitized by Google

Original from
UNIVERSITY OF ILLINOIS AT
URBANA-CHAMPAIGN

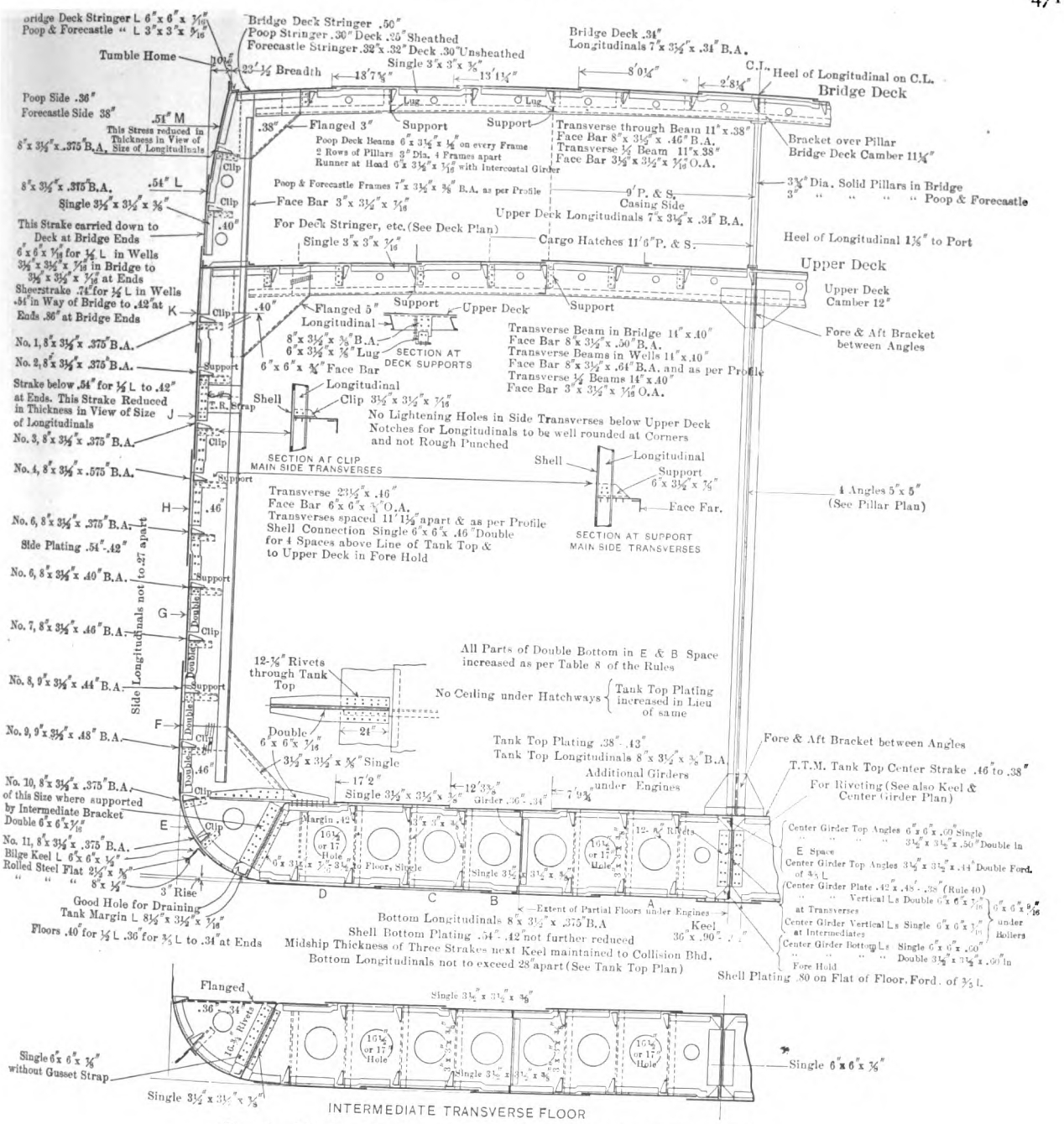

Bridge Deck Stringer .50"
Poop Stringer .30" Deck .25" Sheathed
Forecastle Stringer .32"x .32" Deck .30" Unsheathed
Single 3"x 3"x 5/16"
Bridge Deck .34"
Longitudinals 7"x 3½"x .34" B.A.
Tumble Home
22'½ Breadth
18'7⅝"
13'11⅛"
8'0¼"
2'8¼"
C.L.
Heel of Longitudinal on C.L. Bridge Deck
Poop Side .36"
Forecastle Side .38"
.51" M
Flanged 3"
Support
Transverse through Beam 11"x .38"
Face Bar 8"x 3½"x .46" B.A.
Transverse ½ Beam 11"x .38"
Face Bar 3½"x 3½"x 5/16 O.A.
Bracket over Pillar
Bridge Deck Camber 11¼"
Poop Deck Beams 6"x 3½"x ¼" on every Frame
2 Rows of Pillars 3" Dia. 4 Frames apart
Runner at Head 6"x 3½"x 5/16" with Intercostal Girder
Poop & Forecastle Frames 7"x 3½"x ⅜" B.A. as per Profile
Face Bar 3"x 3½"x 5/16"
9' P. & S. Casing Side
Upper Deck Longitudinals 7"x 3½"x .34" B.A.
For Deck Stringer, etc. (See Deck Plan)
Single 3"x 3"x 5/16"
Cargo Hatches 11'6" P. & S.
Heel of Longitudinal 1⅛" to Port
Upper Deck
Upper Deck Camber 12"
Flanged 5"
Longitudinal
Upper Deck
Fore & Aft Bracket between Angles
8"x 3½"x ⅜" B.A.
6"x 3½"x ⅜" Lug
SECTION AT DECK SUPPORTS
6"x 6"x ⅜" Face Bar
Transverse Beam in Bridge 11"x .40"
Face Bar 8"x 3½"x .50" B.A.
Transverse Beams in Wells 11"x .40"
Face Bar 8"x 3½"x .64" B.A. and as per Profile
Transverse ½ Beams 14"x .40"
Face Bar 3"x 3½"x 5/16 O.A.
Longitudinal
Clip 3½"x 3½"x 7/16"
No Lightening Holes in Side Transverses below Upper Deck
Notches for Longitudinals to be well rounded at Corners and not Rough Punched
SECTION AT CLIP MAIN SIDE TRANSVERSES
Shell
Longitudinal
Support
6"x 3½"x ⅞"
Face Bar
SECTION AT SUPPORT MAIN SIDE TRANSVERSES
4 Angles 5"x 5" (See Pillar Plan)
Transverse 23½"x .46"
Face Bar 6"x 6"x ½" O.A.
Transverses spaced 11'1½" apart & as per Profile
Shell Connection Single 6"x 6"x .46" Double for 4 Spaces above Line of Tank Top & to Upper Deck in Fore Hold
All Parts of Double Bottom in E & B Space increased as per Table 8 of the Rules
12-⅞" Rivets through Tank Top
No Ceiling under Hatchways
Tank Top Plating increased in Lieu of same
Double 6"x 6"x 7/16"
3½"x 3½"x ⅝" Single
21"
Tank Top Plating .38" .43"
Tank Top Longitudinals 8"x 3½"x ⅜" B.A.
Additional Girders under Engines
Fore & Aft Bracket between Angles
T.T.M. Tank Top Center Strake .46" to .38"
For Riveting (See also Keel & Center Girder Plan)
17'2"
Single 3½"x 3½"x ⅝"
12'3⅜"
Girder .36" .34"
7'9⅜"
Margin .42"
12-⅞" Rivets
Center Girder Top Angles 6"x 6"x .60" Single
Center Girder Top Angles 3½"x 3½"x .44" Double Ford. of ⅗ L
Center Girder Plate .42" .48" .38" (Rule 40)
Vertical Ls Double 6"x 6"x 7/16" at Transverses
Center Girder Vertical Ls Single 6"x 6"x 7/16" at Intermediates
Center Girder Bottom Ls Single 6"x 6"x .60"
Double 3½"x 3½"x .90" in Fore Hold
6"x 6"x 9/16" under Boilers
Shell Plating .80 on Flat of Floor, Ford. of ⅗ L
Extent of Partial Floors under Engines
Bottom Longitudinals 8"x 3½"x .375" B.A.
Keel 36"x .90"
Shell Bottom Plating .54" .42" not further reduced
Midship Thickness of Three Strakes next Keel maintained to Collision Bhd.
Bottom Longitudinals not to exceed 28" apart (See Tank Top Plan)
Good Hole for Draining Tank Margin L 8½"x 3½"x 7/16"
Floors .40" for ⅓ L .36" for ⅗ L to .34" at Ends
3" Rise
Rolled Steel Flat 2½"x ⅜"
Bilge Keel L 6"x 6"x ½"
Side Longitudinals not to 27" apart
Double
Flanged
Single 3½"x 3½"x ⅜"
16½ or 17" Hole
Single 6"x 6"x ⅜" without Gusset Strap
INTERMEDIATE TRANSVERSE FLOOR

Fig. 4.—Midship Section of Commonwealth Standard 5,500-Ton Ship

details. Repair slips for vessels up to 800 tons adequately care for coasting and small cargo ships requiring attention. The shops are fitted with modern, labor-saving equipment, and are capable of supplying the yards with material for practically any sized vessel required in the Australian service.

The success of the first 5,500-ton ship, the *Delungra*, has encouraged the management to attempt the construction of several 10,000-ton vessels. The *Delungra* was built to Lloyd's A1 specifications on the Isherwood system of framing, with a double bottom extending from the tunnel recess bulkhead aft to the collision bulkhead forward, and with a main deck, bridge, poop deck and forecastle.

The principal dimensions follow:

Length overall	341 feet 6 inches
Length between perpendiculars	331 feet 0 inches
Molded beam	47 feet 9 inches
Depth at side to upper deck	26 feet 1 inch
Load draft	21 feet 6 inches
Engine power	2,300 indicated horsepower
Boilers	3 Babcock & Wilcox
Speed	10 knots

The vessel has a straight stem and elliptical stern. She is lighted throughout with electricity and all cabins are steam heated. The joiner work is of Australian timber, the panelling of the saloon being polished rosewood. Officers' quarters are on the bridge deck, the master and wireless operators have cabins on the navigating bridge and the crew is accommodated in the poop. The ship's stores are carried in the forecastle and in a store room under the bridge deck. The piping arrangements are very complete for a vessel of this size. When fully loaded, the ship will displace about 8,000 tons.

Cargo is handled by means of four 5-ton steel derricks carried on the foremast and a 20-ton steel derrick is provided for handling heavy weights. The main mast also carries four 5-ton steel derricks. The ship is well equipped

Generated on 2024-09-12 07:53 GMT / https://hdl.handle.net/2027/uiug.30112004006158
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

with lifting gear, having eight main hatch winches and two bridge deck winches, each working a 26-foot steel derrick attached to a derrick post.

Steam is provided at a pressure of 180 pounds per square inch by three boilers of the Babcock & Wilcox type, having a combined heating surface of 8,289 square feet. Only certain portions of these boilers were imported, the balance being built and erected at Walsh Island. The engines are of the triple-expansion type, with cylinders having diameters of 25, 41 and 68 inches and a 45-inch stroke, developing 2,300 indicated horsepower.

All of the auxiliaries were built at the plant, including the condensers, with a cooling surface of 2,600 square feet, air and circulating pumps, feed, bilge and ballast pumps, feed heaters and filters, winch condenser, electric light engine and windlass, winches, steering gear, ventilating system complete and other fittings. The electric installation was supplied and installed by the Sutherland & Ashman Company, of Melbourne.

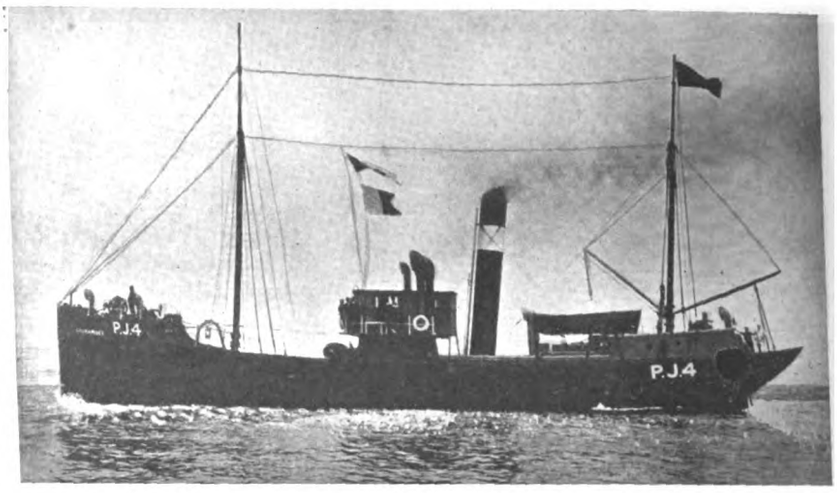


Fig. 5.—N. S. W. Government Trawler, S. S. *Goonamber*, One of Four Similar Vessels Constructed at Walsh Island, Newcastle

Another of the successful attempts at this yard was the construction of four steel trawlers for the State Trawling Industry. The trawlers were entirely satisfactory on their trials and proved equal to the best of the British type. Great delay in obtaining boilers held up the delivery of the trawlers for many months, but with the filling of this shortage, they were rapidly completed.

The boats are typical deep-sea trawlers, having raised quarter decks and forecastle heads forward and with the following details of construction:

Length overall	126 feet 3 inches
Length between perpendiculars	117 feet 0 inches
Molded beam	22 feet 0 inches
Mean depth	11 feet 6 inches
Displacement	438 tons
Speed	10 knots
Indicated horsepower	400

The machinery is aft, while the coal bunkers and boiler feed water tank are amidships. Forward of the tank and bunkers is a large insulated hold for storing fish. This hold is kept packed with ice from the first catch until port is reached. The hold is fitted throughout with vertical and horizontal divisions made interchangeable for convenience. Two of the vessels are provided with refrigerating machinery, which will adequately preserve 65 tons of fish. Above the fish holds on the well deck are the ponds, utilized for sorting the catch after the pocket of the trawler net has been emptied onto the deck. These ponds are formed by stout wooden divisions eighteen inches deep, held in place by cast-iron brackets attached to the deck.

The trawling appliances include the trawl winch, for winding in and out the drag ropes or warps, the deck fairleads for the warps, consisting of single and triple bollards, the gallows from which the otter boards are suspended when raising or lowering the net and all other necessary cleats, ring bolts, etc. Duplicate fittings are provided on each side of the vessel so that trawling may be accomplished from either quarter.

The trawl winch, a machine of special type evolved to meet the requirements of the operation, is provided with two large barrels, one for each drag rope or warp, with small drums on either side for final hoisting of the net aboard, as well as pulling the drag ropes sideways to allow their attachment to the towing block. Two single cylinder engines supply power to the winch. With 1,000 fathoms of 2½-inch steel wire rope out, the maximum trawling speed is five knots.

The propelling machinery, built at Walsh Island, consists of a set of triple expansion engines having cylinder diameters of 12, 19 and 32 inches and a stroke of 24 inches. A Babcock & Wilcox boiler supplies steam at 180 pounds pressure.

Accommodation is provided in these vessels for a compliment of fourteen men. The master's cabin is amidships, under the wheel house; the chief engineer and mate are in cabins on the upper deck amediately abaft the engine room casing, while aft of their cabins are the officers' mess and the galley. Under the after deck house and on the lower deck are two cabins for the second engineer and boatswain, a pantry and the crew's mess-room with two spare berths. The crew, including deckhands and firemen, are accommodated in the forecastle on the upper deck. All of the vessels are electrically lighted and equipped for wireless outfits.

The successful completion of these ships and the immediate prospect of even greater accomplishments have given all members of the Government and engineers of Australia a sound basis for attempting to supply the vessels required in her service. With the development of rolling mills capable of supplying ship plates and the possibility of rapid yard expansion for greater contracts, the commonwealth will go far toward realizing her ambition.

War-Time Changes in Swedish Merchant Marine

According to official information from the ship registry division of the Royal Department of Commerce of Sweden, the Swedish merchant marine comprised the following number of ships and tonnage at the periods shown below:

SWEDISH MERCHANT MARINE

	Steamships		Sailing Vessels		Motor Vessels	
Date	Number	Gross Tonnage	Number	Gross Tonnage	Number	Gross Tonnage
July 1, 1913.	1,295	993,205	1,499	178,548	110	10,6[illegible]
Jan. 1, 1914.	1,307	1,019,921	1,478	176,799	119	15,0[illegible]
July 1, 1914.	1,311	1,031,856	1,464	175,597	125	22,764
Jan. 1, 1915.	1,321	1,053,787	1,455	174,162	129	26,676
July 1, 1915.	1,355	1,007,841	1,416	171,621	162	32,661
July 1, 1917.	1,251	871,842	1,122	133,549	338	51,452
Jan. 1, 1919.	1,209	847,654	1,079	124,372	396	77,439

Generated on 2024-09-12 07:49 GMT / https://hdl.handle.net/2027/uiug.30112004006158
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

From the above figures it will be seen that the Swedish merchant marine decreased from July, 1914, to January, 1919, by 102 steamships of 184,202 gross tons, and 385 sailing vessels of 51,225 gross tons. The motor vessels, on the other hand, show an increase of 271 vessels of 54,666 gross tons. Thus, the total decrease is 216 vessels of 146,611 calculated gross tons (to the actual tonnage of the steamships and motor vessels has been added one-third of the actual tonnage of the sailing vessels). As compared with the situation before the war, the decrease in tonnage is 13.2 percent on the gross tonnage. Thus the Swedish merchant marine is now about one-seventh less than at the outbreak of the war.

100-Foot Wooden Harbor Tug Boats Building at the Plant of Consolidated Shipbuilding Corporation

THROUGH the courtesy of the Emergency Fleet Corporation and the Consolidated Shipbuilding Corporation, formerly known as the Gas Engine & Power Company, and Charles L. Seabury & Company, Consolidated, Morris Heights, N. Y., we are enabled to describe the 100-foot wooden harbor tugs building for the United States Shipping Board.

The Consolidated Shipbuilding Corporation has four of these tugs under construction and will complete its contract sometime during this summer. These small tugs were designed for hard service, and they are, consequently, of very heavy and massive construction. For the handling of the heavy timber used in their construction, this company installed a large lumber derrick to facilitate the swinging of frames, deadwood, knees, planking, etc., into position. The added equipment of the Consolidated Shipbuilding Corporation, since the outbreak of the war in 1917 has transformed the plant from one capable of building small craft and medium-sized yachts to one which is now well equipped and capable of handling large trading ships, tow boats or tugs, either steam or motor driven.

General Arrangement of the Tugs

J. Murray Watts, naval architect, Philadelphia, Pa., is the designer of these boats. Their lines are similar to the usual harbor tug of 100 feet in length with wooden deck house and pilot house. The deck house contains a companionway to the forecastle, ice box, galley and mess room, lamp locker, two staterooms and upper fire and engine rooms. The pilot house and captain's room are on top of the deck house. The crew has quarters under the forward deck in the forecastle.

Feed tanks are located forward under the forecastle and aft of the engine room. Athwartship bunkers are located between the fireroom and engine room, and wing bunkers are located at the sides of the fireroom.

Construction

The boats are built in accordance with the American Bureau of Shipping rules and are of wood throughout to the following specifications:

Keel: To be of white oak, sided 12 inches and molded 13 inches.

Stem: To be of white oak, sided 11 inches and molded 14 inches.

Stern post: To be of white oak, sided 11 inches at the keel.

Frames: To be of white oak, sided 6 inches double.

Keelson: To be 12 inches by 12 inches yellow pine in long lengths with scarfs not less than 6 feet long.

Sister keelsons: To be of 10 inches by 12 inches yellow pine.

Shaft log: To be of white oak in halves, 10 by 24 inches.

Deadwoods: To be of white oak, sided 18 inches and molded back to receive the frames.

Bottom ceiling: To be of yellow pine 3 inches thick.

Side ceiling: Ceiling between the bilge strakes and the clamps to be 3¼-inch yellow pine.

Clamps: To be yellow pine 6 inches by 10 inches, three strakes on each side in long lengths, scarfed.

Shelf: To be of yellow pine, two strakes 5 inches by 9 inches, lock strake 5 inches by 10 inches locked in beam 1 inch.

Deck beams: Main beams yellow pine sided 11 inches, and regular beams sided 8½ inches.

Knees: To be of white oak, or hackmatack.

Outside planking: Side and bilge planking to be 3¼ inches by 8 inches yellow pine.

Sheer strakes: Three sheer strakes 4 inches by 10 inches yellow pine and fastened with 7/16-inch by 8-inch galvanized spikes.

Deck planking: To be of 3-inch by 3-inch Douglas fir or yellow pine.

Plank sheer: To be of white oak 4 inches by 14 inches, let down over the stanchions and fastened with 7/16-inch by 8-inch galvanized spikes.

Rudder: The rudder stock and main piece to be of the best steel casting; blade and balance to be of oak.

Shoe: Cast steel shoe for rudder.

Water tanks: To be either stock steel tanks or independent wood tanks, as preferred.

Steel bunker bulkheads: Non-watertight steel bunker bulkheads; steel bulkhead forward of boiler, fitted as shown on plans.

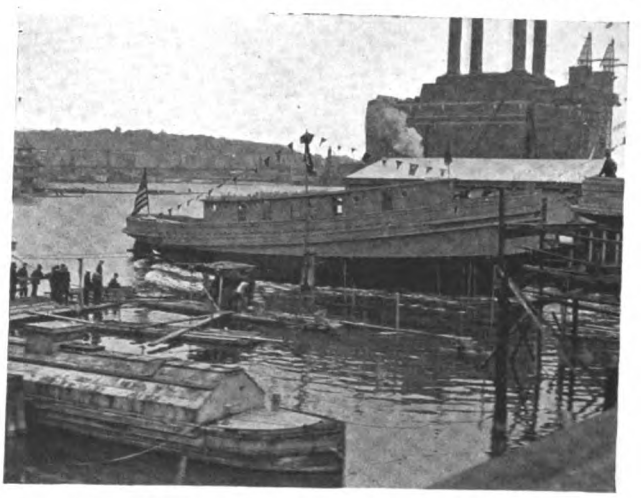
Outboard joiner work: The entire hull, decks and rails to be well planed off smooth and fair and finished ready for painting.

Wood deck house: To be of yellow pine. Top of deck house to be of Oregon pine, felted and covered with No. 6 canvas.

Pilot house: To be of yellow pine.

Machinery

Propulsion is by an inverted compound engine with cylinders 18 inches and 38 inches diameter by 26 inches stroke supplied with steam at 155 pounds pressure by a single end Scotch boiler 14 feet 6 inches diameter, 12 feet long, having 2,500 square feet of heating surface and 75 square feet of grate area. The engine is manufactured by the Consolidated Shipbuilding Corporation, and this company is also manufacturing the engines for the other tugs building at the plant.



Launching 100-Foot Tug at Yard of Consolidated Shipbuilding Corporation

The construction of the six vessels in the yards of the Consolidated Shipbuilding Corporation is not only under the supervision of their own superintendent and his assistants, but also under the surveillance of Emergency Fleet inspectors, who look after the Government's interests in the inspection of workmanship and materials.

Generated on 2024-09-12 08:18 GMT / https://hdl.handle.net/2027/uiug.30112004006158
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Investigation Into Bulkhead Stiffeners

Stresses Figured in Accordance with Rules of Classification Society—Only Clipped and Free-Ended Stiffeners Considered

BY A SPECIAL CORRESPONDENT

THE following data and stresses have been figured for a bulkhead designed in accordance with the rules of one of the largest classification societies. Only clipped and free-ended stiffeners have been considered, as it is the intention to investigate bracketed stiffeners at a later time. In this connection, however, it might be said that from the data already collected it appears to the writer that entirely too much credit is given to the end fixing ability of brackets.

Nothing original is claimed for the following figures, but it is thought that this is the first attempt made to collect these data into a form which would permit publication. Much of the theoretical data has been taken from Professor Hovgaard's papers on "Strength of Bulkheads," read before the Society of Naval Architects and Marine Engineers in 1910 and 1911.

The figures assumed for the bulkhead considered are not unusual and it would be possible to find special conditions which would develop greater stresses than those obtained from the assumed conditions.

The bulkhead considered is shown in the sketch, Fig. 1, and has the dimensions shown on the figure. All the calculations are given in detail, because, while not necessary to the older men in the profession, it is hoped that they will make this paper more valuable and interesting to the large number of new draftsmen just entering this profession and possibly form a guide for their efforts.

The classification societies admit two classes of bulkheads, i. e., ordinary structural bulkheads which are subjected to stress only at times of an accident, and those which form the boundaries to trim tank or deep ballast tanks which are subjected to pressure at regular intervals. The former class is subdivided into bulkheads for cargo vessels and bulkheads for passenger vessels. In the latter, it will be seen the stresses are less than in cargo bulkheads. Each of these classes will be considered in this paper. Three types of stiffeners are tabulated, i. e., no end attachments, clipped at ends, and bracketed. The two former classes are considered in the following data.

By referring to the rules, we find that the elements considered in determining the size of stiffeners are: (1) length, (2) spacing, (3) head, and (4) type of end connections. All of these elements are also the terms employed in figuring the bending moment. It is therefore seen that this is a scientific method of determining scantlings. The only term which is not considered in its full value, and this only in the case of the first type of bulkheads, is the actual head. However, in deep tank bulkheads this is adequately considered.

From Fig. 1 we obtain the following data:

L = length of stiffeners, lower section, = 12 feet.
S = spacing of stiffeners = 2 feet 6 inches.
H^1 = head to load waterline = 6 feet.
H = head to bulkhead or strength deck = 7 feet 6 inches.

These data are sufficient to enter the rules. We will first consider the stiffeners with no end attachments, and in this discussion bulb angle stiffeners only have been considered.

With this value of head and L = 12 feet, we can enter the tables.

From the above data we see from the tables of bulb angle stiffeners that an 8-inch by 3-inch by .42-inch bulb angle is required. Such a section, however, is not obtainable in this country, so we take the nearest section obtainable, which is an 8-inch by 3-inch by .425-inch bulb angle, having the following characteristics:

Area ..... 5.30 square inches
Moment of inertia ..... 42.9 inch units

Fig. 1.—Sketch of Bulkhead Considered

Generated on 2024-09-12 08:00 GMT / https://hdl.handle.net/2027/uiug.30112004006158
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Section modulus	10.0 inch units
Neutral axis from bulb	4.30 inches
Neutral axis from heel	3.70 inches
Weight per foot of length	18.0 pounds

To obtain the stresses, we must figure the maximum bending moment and the section modulus of stiffener and strip of bulkhead plating acting with it. The ends are free to change slope, so our bending moment, using Professor Hovgaard's notation, is:

$$M = .126\ Pl.$$

Where P is load and

l = length in feet.

P, we find for a combined uniform and uniformly increasing load, is:

$$P = W'slh + \frac{wsl^2}{2},$$

where the first term is the uniform load and the second the varying load. The terms of this formula have the following meaning:

W' = weight of water per cubic foot.
s = frame spacing in feet.
l = length of stiffener in feet.
h = head at top of stiffener in feet.

Solving this equation, we get:

$$P = 64 \times 2.5 \times 12 \times 7.5 + \frac{64 \times 2.5 \times 12 \times 12}{2}.$$

$P = 14{,}400 + 11{,}520.$
$P = 25{,}920$ pounds.

In this case h, the head, has been taken to the bulkhead deck. This is probably the greatest head the bulkhead will be subjected to, if the vessel remains afloat after damage.

From this value of P, we get for the bending moment: $M = .126 \times 25{,}920 \times 12 = 39{,}191$ foot pounds, and in inch unit terms $M = 470{,}292$ inch pounds.

This, of course, acts at about the middle length of the stiffener.

In figuring the stress in the extreme fibers of the stiffener, it is necessary to find the section modulus of the combined stiffener and bulkhead plating. It is assumed that a strip of the bulkhead plating with a width of twenty times the thickness is acting with the bulb angle stiffener. This is considered to be a reasonable assumption. However, as a matter of interest, other widths are considered in the following figures:

Fig. 2 shows the stiffener and its functional strip of plating, and from this we figure two new characteristics as follows:

The plating is taken at .32 inch, which is in accordance with the rules.

Width of plating is taken as 20 t

Name	Area	Dist. of C. G. from Bulb of Angle	Moment
Plate	2.04	8.16	16.65
Stiffener	5.30	4.30	22.79
Sum	7.34	5.37	39.44

It is now necessary to find the moment of inertia about this new neutral axis.

Taking first the plate, the moment of inertia about its own axis is given by

$$\frac{1}{12}Ad^2, \text{ or } \frac{2.04 \times .32^2}{12} = .0174\text{-inch units.}$$

To find the moment of inertia about the new axis, we use the principle that $I_o = I + Ad^2$, where d = distance of transference, or, in other words, the distance between the two neutral axes. Then $I_o = .0174\ (2.04 \times 2.79^2) = .0174 + 15.99 = 16.01$ inch units.

The distance 2.79 in the above equation is found as follows:

8.00 inches — 5.37 inches = 2.63 inches distance of neutral axis from heel of angle; then 2.63 inches + .16 inches (neutral axis of plate from heel) = 2.79 inches.

Taking now the bulb angle, we have for the new moment:

$I_o = I + Ad^2 = 42.9 + [5.3 \times (5.37 - 4.30)^2] = 42.9 + (5.3 \times 1.12) = 48.84$-inch units.

Total $I_o = 16.01 + 48.84 = 64.85$-inch units.

Then section modulus is

$$\frac{I}{y} = \frac{64.85}{5.37} = 12.10\text{-inch units.}$$

We can now find the maximum stress at the extreme fibre. Assume the pressure on the calking side of the

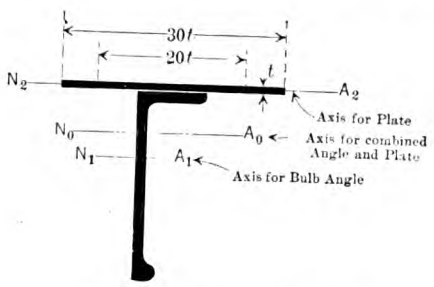


Fig. 2.—Stiffener and Plating

bulkhead. This throws the outer edge of the bulb angle into extension and the amount of this force is as follows: f being stress, M being bending moment and S section modulus, all in inch units, then

$$f_t = \frac{M}{S} = \frac{470{,}292}{12.10} = 38{,}859 \text{ pounds per square inch.}$$

The compression in the plating is

$$f = \frac{My}{I} = \frac{470{,}292 \times (8.32 - 5.37)}{64.85} = 21{,}466 \text{ pounds per square inch.}$$

If, however, the pressure is on the non-calking side of bulkhead, the plating is in tension and this stress will be reversed.

The assumption of the width of the plating acting with the stiffener is moderate. Suppose we assume this width to be increased to 30 t: then the neutral axis and section modulus calculations will be as outlined below.

To find the neutral axis:

Name	Area	Dist. of C. G. from Bulb of Angle	Moment
Plate	3.07	8.16	25.05
Stiffener	5.30	4.30	22.79
Sum	8.37	5.84	48.84

$$I \text{ of plate} = \frac{3.07 \times .32^2}{12} = .0262.$$

I_o of plate $= .026 + [3.07 \times (8.00 - 5.84\ .16)^2] = .026 + 16.50 = 16.54$-inch units.

I_o of stiffener $= 42.90 + [5.3 \times (5.84 - 4.30)^2] = 42.90 + 12.56 = 55.46.$

Total $I_o = 16.54 + 55.46 = 72.00$-inch units.

Then $S = \frac{72.00}{5.84} = 12.33$-inch units.

Generated on 2024-09-12 08:02 GMT / https://hdl.handle.net/2027/uiug.30112004006158
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

With the pressure on the calking side, we get:

$$f_t = \frac{470{,}292}{12.33} = 38{,}142 \text{ pounds per square inch.}$$

$$f_c = \frac{470{,}292 \times (8.32 - 5.84)}{72.00} = 16{,}199 \text{ pounds per square inch.}$$

We thus see that with a width of thirty times the thickness the stresses in the plating are slightly greater, and if a still wider strip were considered, the stress in the angle would decrease. It would not be safe, however, to assume any greater width of plating unless its thickness were increased, since buckling will occur at slightly increased stresses over those found.

The most important thing about these figures to notice is that the stress in this condition is beyond the elastic limit of the material, and if the element of bulkhead plating is not figured the stress would be far beyond the elastic limit. To prove this, assume that the stiffener acts alone. Then

$$f = \frac{470{,}292}{10.0} = 47{,}029 \text{ pounds per square inch.}$$

In view of this, it would be wise to show on the bulkhead plans ample riveting strength between plating and stiffener and to insist upon good workmanship, i. e., fair holes and sound, well-driven rivets, because otherwise the plating and stiffener will not act together.

It will be shown later that the functional strip of plating is more important in reducing the stress in a stiffener than the clips at the ends of clipped stiffeners.

Also in this connection it is to be noted that the plating should, if possible, be placed so that it carries compression, because then the water pressure tends to force the plating into closer contact with the stiffeners. The rivet spacing should not be too great, since there is a tendency for the plating, when in compression, to buckle away from the stiffener between the rivets.

As noted above, the stress in the stiffeners is beyond the elastic limit, and even in the nature of the construction this should not be permissible. This bulkhead is one of the class which will seldom, if ever, be called upon to withstand pressure, because it is intended only to subdivide the ship into compartments, which will only be flooded when in collision or at times of accident. It should, however, be capable of withstanding this pressure when called upon. The head has been taken up to the bulkhead deck, and it might be argued that when one compartment is flooded the new waterline will still be below this deck level. This is true, if too much change in trim does not occur, but still another point to be considered is that when the tank is flooded to a level below this deck level dynamic stresses would arise, due to the motion of the ship in a seaway. The combination of static and dynamic stresses in this case exceeds those figured for the maximum liable static head, as already done.

It has been pointed out above that the connection between the plating and stiffener is very important, and in view of this it is proper to investigate this riveting. The rules call for ¾-inch diameter rivets spaced seven diameters, or 5¼ inches on centers. We will figure the horizontal shear at a point 2 feet from the bottom of the stiffener and get the vertical shear in the rivets at this point:

$$\text{Shear force } F = \frac{Wshl}{2} + \frac{2Wsl^2}{6} = \frac{64 \times 2.5 \times 7.5 \times 10}{2} + \frac{2 \times 64 \times 2.5 \times 100}{6} = 6{,}000 + 5{,}333 = 11{,}333 \text{ pounds.}$$

Then since $q = \frac{F}{I} my$

where q = shear stress in pounds per inch.
I = Moment of inertia.
m = area above section at which shear is to be found.
y = distance of center of gravity of area to neutral axis.

$$q = \frac{11{,}333}{72.0} \times \text{area functional plate} \times \text{distance c. g. of plate to neutral axis.}$$
$$= 157.4 \times 3.07 \times (2.16 + .16).$$
$$= 1119.7 \text{ pounds per inch of depth.}$$

The stress per rivet is $1119.7 \times 5.25 = 5{,}878$ pounds.

Then stress per square inch of rivet is $\frac{5{,}878}{.442} = 13{,}300$ pounds.

This stress is considered too high and the pitch should be reduced, especially as it has been shown that the functional plating reduces the stress in the stiffener considerably.

We will now consider clipped stiffeners for this same bulkhead. The construction in this case consists of fitting double angle clips at the base and head of the stiffeners, which tend to hold them up to their work. The riveting

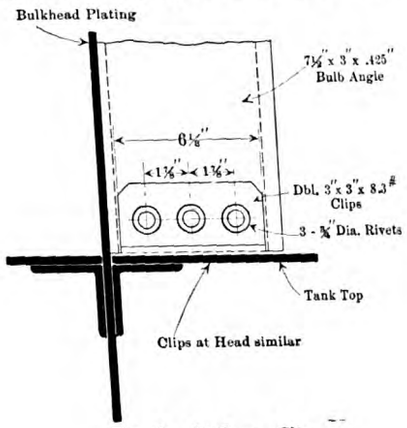


Fig. 3.—Stiffener Clips

for these clips is fixed by the rules and the required construction is shown in Fig. 3.

As will be seen, the classification rules permit a reduction in the stiffener in this case of 15 percent. This reduction, to the writer's mind, is rather generous. Of course, it must be borne in mind that it is possible very nearly to fix the ends of the stiffeners by clips, if the necessary riveting strength is introduced. Before further considering the end connections of these stiffeners, we will obtain the required scantlings from the rules.

In this case we proceed as before and find from the table that the required stiffener would be a 7½-inch by 3-inch by .425-inch bulb angle with the following characteristics:

Area	5.02 square inches.
Moment of inertia	35.70-inch units.
Section modulus	8.80-inch units.
Neutral axis from bulb	4.08 inches.
Neutral axis from heel	3.42 inches.
Weight per foot of length	17.1 pounds.

The weight of plating will be the same as in the case just considered, so we can proceed as before to find the section modulus of angle and plate, when acting together. The width of plating has been taken as thirty times the thickness. The figures are as follows:

Name	Area	Dist. of C. G. from Bulb of Angle	Moment
Plate	3.07	7.66	23.52
Stiffener	5.02	4.08	20.48
Sum	8.09	5.44	44.00

Generated on 2024-09-12 08:07 GMT / https://hdl.handle.net/2027/uiug.30112004006158
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

$$I \text{ of plate} = \frac{3.07 \times .32^2}{12} = .0262\text{-inch units.}$$

$$I_o \text{ of plate} = .03 + [3.07 \times (7.5 - 5.44 + .16)^2] = .03 + 15.14 = 15.17\text{-inch units.}$$

$$I_o \text{ of stiffener} = 35.70 + [5.02 \times (5.44 - 4.08)^2] = 35.70 + 9.29 = 44.99.$$

Total $I_o = 15.17 + 44.99 = 60.16$-inch units.

$$\text{Then } S = \frac{60.16}{5.44} = 11.05\text{-inch units.}$$

We will now consider the end connections. The rules call for three ¾-inch diameter rivets in the clips. The figures for these clips will be about as shown on Fig. 3. The polar moment of inertia of these rivets will be as follows, using the figures shown on the sketch:

$$I_p = Ay^2 \times 2 = .442 \times 2 \times 1.88^2 = 3.12\text{-inch units.}$$

Now the problem is to find how much bending these clips will take. This will, of course, not be equal to the bending moments at the ends, if the stiffener is considered fixed, but will be a proportion of the same.

The allowable stress in the rivets through the clips when considering bending only should not exceed 15,000 pounds per square inch. This then gives as the allowable bending moment at the end:

$$M = \frac{fI_p}{y} = \frac{15{,}000 \times 3.12}{1.88} = 24{,}900\text{-inch pounds.}$$

If this stiffener were fixed at the ends, the bending moment at the lower end, due to the head, would be, using again Professor Hovgaard's notation:

$M_b = .092\ Pl$, which gives
$M_b = .092 \times 25{,}920 \times 12 = 28{,}016$ foot pounds.
$= 336{,}192$-inch pounds.

The bending moment at the head of the stiffener would be:

$M_h = .075\ Pl$, which gives
$M_h = .075 \times 25{,}920 \times 12 = 23{,}328$ foot pounds.
$= 279{,}936$-inch pounds.

Note now that the bending moment which can be taken by the clips bears the following ratio to that actually existing at the ends, if they were fixed:

$$\text{At bottom } \frac{24{,}900}{343{,}200} = 7.26 \text{ percent.}$$

$$\text{At top } \frac{24{,}900}{279{,}936} = 8.91 \text{ percent.}$$

If this stiffener were fixed at the ends, the bending moment would be at 6.24 feet from top and has been found to be 470,292 inch pounds. With the ends clipped, as in this case, the maximum bending moment is about at the same point and is equal to 470,292 — 24,900 = 445,392 inch pounds.

This gives us a stress in the stiffener, as follows:

$$f = \frac{M}{S} = \frac{445{,}392}{11.05} = 41{,}212 \text{ pounds per square inch.}$$

The stress in the plating is

$$f = \frac{My}{I} = \frac{445{,}392 \times (7.5 + .32 - 5.44)}{60.16} = 17{,}619 \text{ pounds per square inch.}$$

The above stresses are higher than those obtained for free-ended stiffeners. The stress in the stiffener is too high for safety, even when it is realized that this bulkhead may only once be called upon to withstand this pressure. The failure at this time may mean the loss of the vessel and endanger the lives of the crew.

The percentage increase in stress is, in the case of the stiffener:

$$\frac{41.212}{38{,}142} = 1.082, \text{ or } 8.2 \text{ percent increase, and in the plating}$$

$$\frac{17{,}619}{16{,}199} = 1.089, \text{ or } 8.9 \text{ percent increase.}$$

As noted before, the rules allow a reduction in scantling of about 15 percent.

The decrease in bending moment, as figured above, is

$$\frac{470{,}292}{445{,}392} = 1.056, \text{ or } 5.6 \text{ percent decrease.}$$

If no credit is given to the end clips on the stiffeners, the stress in the stiffener would be:

$$f = \frac{470{,}292}{11.05} = 42{,}560 \text{ pounds per square inch.}$$

The above figure shows that it is necessary to have very good workmanship on the clips, securing the stiffener ends, if stresses far beyond the elastic limit are to be avoided. It is especially imperative to have good, fair rivet holes and well-driven rivets, or slip will occur. The slip, even if very slight, would take the stiffener out of the partially fixed type and put it into the free ends type, thereby, as shown above, increasing the already high stress by

$$\frac{42{,}560}{41{,}212} = 1.033, \text{ or } 3.3 \text{ percent.}$$

If the functional plating is neglected, the stress in the stiffeners is

$$f = \frac{445{,}392}{8.80} = 50{,}612 \text{ pounds per square inch.}$$

If the effect of the clips is neglected as well as the functional plating, we get the following stress:

$$f = \frac{470{,}292}{8.80} = 53{,}442 \text{ pounds per square inch.}$$

The clips themselves should be of such a weight as not to distort when stressed, and where the deck or tank top plating is under 15 pounds per square foot local doubling plates should be fitted to secure rigidity and avoid deflection at supports.

The bending stress in the plating cannot be determined easily, but a check on the strength can be made as follows:

At mid-height this plating has a thickness of .32 inch. Assume the plate freely supported between the heel of

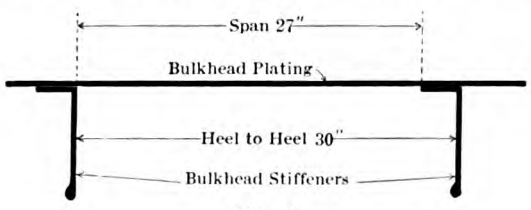


Fig. 4

one and toe of the adjoining stiffener (see Fig. 4). Then bending moment is given by

$$M = \tfrac{1}{8}\ Wl.$$

Where W will be the load on a strip of plating 27 inches long and 1 inch wide, due to a head of 13.5 feet. This gives $W = 5.94 \times 27$, where 5.94 is the pressure in pounds per square inch due to the head. Then the bending moment is

$$M = \frac{5.94 \times 27 \times 27}{8} = 541\text{-inch pounds.}$$

Generated on 2024-09-12 07:52 GMT / https://hdl.handle.net/2027/uiug.30112004006158
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

The moment of inertia of the plate is

$$I = 1/12\ (.32 \times 1 \times .32^2) = .00273\text{-inch units.}$$

$$\text{Then } f = \frac{541 \times .16}{.00273} = 31{,}707 \text{ pounds per square inch.}$$

From this figure it can be seen that, while high, the corresponding deflection will not be so great as to destroy the calking, if the latter is well done.

The above method of figuring the stress in plating is only an approximation and is valuable as a guide only. The actual stress calculation is highly mathematical and of questionable accuracy.

We will now consider the shear on the rivets connecting the plating and stiffeners, due to the tendency of these two members to slip upon each other.

The shear on the rivets connecting the plating to the stiffeners two feet above the bottom is figured as follows:

Shearing force:

$$F = \frac{64 \times 2.5 \times 7.5 \times 10}{2} + \frac{2 \times 64 \times 2.5 \times 100}{6} = 6{,}000 + 5{,}333 = 11{,}333 \text{ pounds.}$$

$$q = \frac{11{,}333}{60.16} \times 3.07 \times (2.06 + .16).$$

$$q = 280 \times 10.95 = 1264.8 \text{ pounds.}$$

Riveting being as above, the stress per square inch of rivet would be:

$$\frac{1264.8 \times 5.25}{.442} = 15{,}023 \text{ pounds.}$$

This latter stress is too high for shear and shows that the rules should reduce the pitch of rivets connecting the plating to the stiffeners.

The shear on the rivets in the clips is given by

$$F \text{ at bottom support} = \frac{Wshl}{2} + \frac{2\,Wsl^2}{6}$$

$$= \frac{64 \times 2.5 \times 7.5 \times 12}{2} + \frac{2 \times 64 \times 2.5 \times 144}{6}$$

$$= 7{,}200 + 7{,}680 = 14{,}880 \text{ pounds.}$$

We have three ¾-inch rivets in double shear, so the equivalent stress for single shear would be

$$q = \frac{14{,}880}{1.8 \times 3 \times .442} = 6{,}226 \text{ pounds,}$$

if the rivets in the tank top angles are not considered. If we take two such rivets as aiding to resist the above load, we have (assuming tank top rivets as ¾-inch diameter):

$$q = \frac{14{,}880}{1.8 \times 3 \times .442 + 2 \times .442} = \frac{14{,}880}{3.27} = 4{,}550 \text{ pounds.}$$

To this must be added the stress due to bending, as found before. Some writers add the two directly, but it is, I think, wrong and the two should be added as a combined stress, i. e.,

$$P = \sqrt{q^2 + f^2}.$$

This gives:

$$P_1 = \sqrt{6226^2 + 15{,}000^2}.$$

$$P_1 = 16{,}250 \text{ pounds per square inch.}$$

It will be seen that this gives a more moderate stress than if they were simply added, i. e.,

$$15{,}000 + 6{,}226 = 21{,}226 \text{ pounds per square inch.}$$

(To be continued.)

Planing of Angles in Ship Construction for Watertight Calking

BY E. R. SPENCER*

LEAKAGE in a steel vessel is ordinarily traceable to inferior riveting or ineffective calking. Experience with some of the first steel seagoing ships to be put into service during the pressing period of war-time marine activity indicated that it was practically impossible to calk the edges of plates and the lips of angles in steel ship construction without first planing (or, as sometimes termed, beveling) the calking edge to get a clean, sharp, workable lip, free from scale. Calking has been common practice in many of the older shipyards of the country for many years. Various methods have been in practice for planing the plates and angles. The handling of plates is not as difficult as the handling of angles. The latter, when used in any quantity, presents one of the most trying problems in the structural shop, which has resulted in the installation of special machine tools to do this planing work. Angles of light section are not so difficult to handle by the average type of angle planing machine, but when it comes to planing the heavier sections, the driving power that has to be exerted on the angle as it passes through the driving rolls of the planer to accomplish the work with reasonable speed, leads to difficulty due to the tendency to warp the angle. Another difficulty that developed was to get a machine of sufficiently substantial construction, and possessing enough driving power, to handle the larger angles commonly used in present-day ship construction.

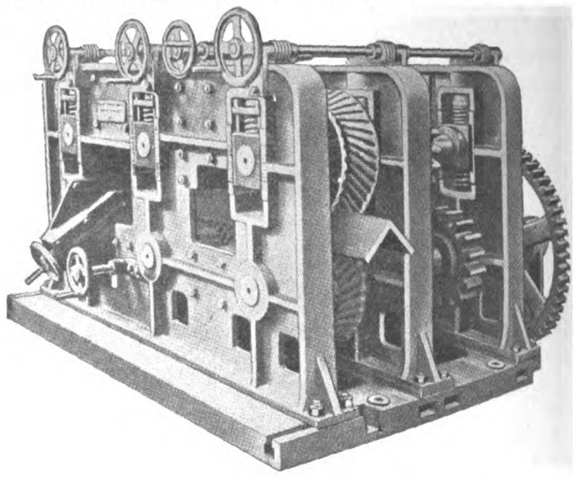


Fig. 1.—Feeding-In End of Angle Planer

This machine is designed for planing angles for ship work to permit calking. Ordinarily one pass through the machine is sufficient. The planing can be straight or to any angle desired

NEW MACHINE FOR THE HULL DEPARTMENT

A machine tool that has been developed to meet the requirements dictated by service conditions is always of particular interest to the engineer and the works manager, who are called upon to get results by the most effective means at their command. Accordingly, the following description of a new type of angle planer will be of particular interest to the hull construction men and the marine engineer in the shipbuilding field.

This angle planer, on which patents are pending, performs three operations simultaneously, with three separate tools; namely, it planes the two lips of the angle passed through it, and, if required, also planes off the heel of the angle, with an independently-controlled tool for each

* Sales Engineer, Thomas Spacing Machine Company, Pittsburgh, Pa

Generated on 2024-09-12 08:05 GMT / https://hdl.handle.net/2027/uiug.30112004006158
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

of the three operations. Each edge of the angle can be planed off to any shape of lip, depending upon the shape of the tool used for the cut. Planing the heel is required where one angle has to be fitted within another, in which case the fillet in the corner of the outer angle interferes with the inner angle being brought up to a close fit on both faces unless the heel of the inner angle is removed.

SPECIAL FEATURES

A view of the feeding-in end and operating side of this planer is found in Fig. 1, while Fig. 2 shows the discharge end, with the direct geared driving motor mounted in place. These views give a good idea of the rugged, substantial construction of this machine. Many of the features of design are evident from these illustrations; others should be considered in detail, as they illustrate how the design of the machine has been developed according to service requirements.

DRIVING ROLLS

In the first place it was determined that the proper method of driving the angle through the machine was to have all six driving rolls, three upper and three lower, arranged for power drive. Furthermore, in order to eliminate the tendency of the angle to curl in case of its being driven all on one flange, the driving rolls were made V-shaped, so that the two outer and two inner faces of the angle would all be in contact with the driving rolls under equal pressure. This necessitated rather an elaborate train of main driving gears (described below), these being machine-cut in order to assure a smooth running, efficient drive in which alinement would be maintained. It will be noted that the screw-down for the three upper driving roll shafts is carried through spiral compression springs, the compression of which is set independent of the screw-down, by means of tie bolts. With this arrangement it is difficult for the operator to put an excessive driving roll pressure on the angle, except by deliberately setting the rolls too close by means of the screw-downs. Without this feature the driving rolls are apt to act like a milling cutter, often entirely removing the manufacturer's name, which is usually rolled into the face of the angle when it is made. With the spring mounted drive the angle goes through the machine without any such grinding action, the rolls adjusting themselves automatically to variations in the thickness of the angle.

In addition to the main driving rolls, four guide rolls are provided, two upper and two lower. The outside upper roll is shown in Fig. 2 where the angle is leaving the machine.

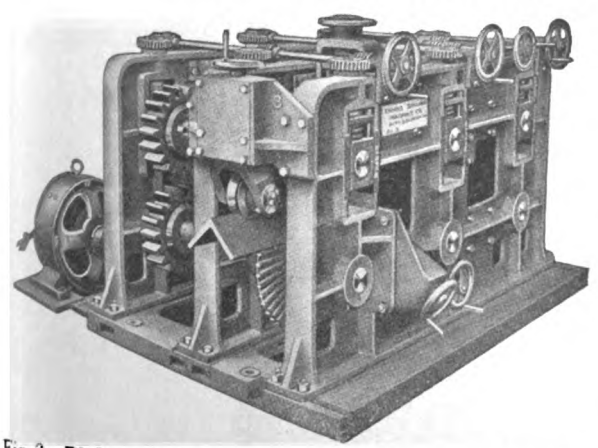


Fig. 2.—Discharge End of Angle Planer, Showing Straightening Roll

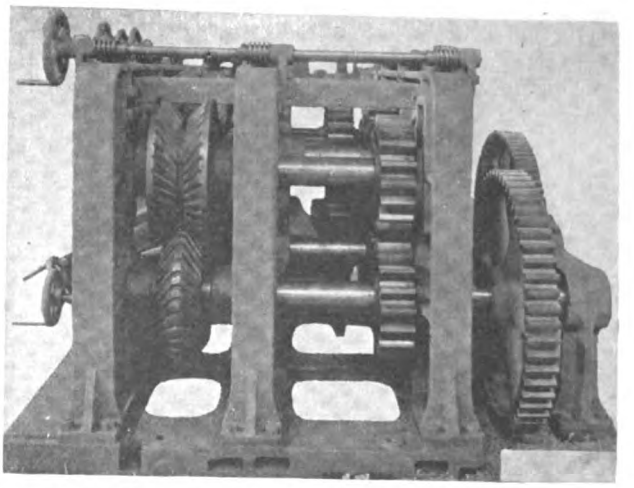


Fig. 3.—End View, Showing Details of Conical Driving Rolls, Main Driving Gear Train and Reduction Gears

This roll serves as a straightening roll, and accordingly it is provided with a separate screw-down. The inside upper guide roll, which is located between the second and third set of upper driving rolls, is also provided with a screw-down, the hand wheel of which is shown at the top of the machine in Fig. 2. The two lower guide rolls are located respectively between the first and second, and second and third, lower driving rolls, and are hung on eccentric shafts, so that their vertical position is adjustable to suit different thicknesses of the angle by releasing a set-screw. With this arrangement of adjustable guide rolls, the angle planer serves also as a straightening roll, so that the angle, when it comes out of the machine, is ready to use without its having to be handled again for straightening. To assist in starting the angle through the machine, an upper guide shoe is also provided, which is located between the first and second upper driving rolls, directly in front of the vertical tool holder above the heel of the angle. This shoe guides the entering end of the angle into the machine in the proper vertical position to start the cut on the heel before it reaches the second set of driving rolls, after which the angle is not in contact with the shoe. The details of the drive are such that the machine completely planes the single angle without having to use another to help the first one through.

HOW THE ROLLS ARE SET

The position of the driving rolls is indicated by gages shown in Figs. 1 and 2, on the operator's side of the machine; these permit the operator to set the screw-down correctly before the angle is passed through the machine. When once set for a given size of angle, the screw-down does not have to be changed as long as the same size of angle is being handled. Slight variations are taken care of by the safety spring, without the screws of the screw-down being subjected to undue pressure. It is interesting to note that any size of angles, from the smallest ordinarily rolled as standard up to 8 inches by 8 inches by 1 inch, can be handled in this machine by simply changing the setting of the screw-down, guide rolls, and straightening roll.

ADJUSTMENT OF CUTTING SPEED

To handle such a range of sizes as this, adjustment of the cutting speed is required, and to provide for this it is advisable to equip the machine with an adjustable speed motor. A 25-horsepower motor with a 3 to 1 speed varia-

Generated on 2024-09-12 07:59 GMT / https://hdl.handle.net/2027/uiug.30112004006158
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

tion is used, the range of speeds recommended being from 400 to 1,200 revolutions per minute. This condition is met most readily by use of a direct current motor in which the speed variation is obtained by field control. With a 3 to 1 speed range, cutting speeds on the machine varying from 15 feet to 45 feet per minute are obtained. Where only alternating current power is available, a constant speed motor is used, and the gears are arranged to give a cutting speed of 25 or 30 feet per minute.

That this machine fully meets service requirements is indicated by the fact that in a service test which was conducted a year or so ago at one of the large shipyards, the largest standard size of angle, namely, 8 inches by 8 inches by 1 inch, was put through the machine at a cutting speed of 45 feet per minute, with all three cutting tools taking full cuts on the angle, without the machine showing any signs of laying down on the job. This opeating condition was continued for several hours, and the machine handled the angles as fast as they could be fed into it.

A detail view of the feeding-in end of the machine is shown in Fig 3, in which are to be seen the first upper and lower conical driving rolls, the train of main driving roll gears and shafts, and the train of reduction gears from the motor to the first main drive shaft. In order that each set of upper driving rolls shall ride independently on the angle through the spring-mounted screw-down previously described, it is necessary that the three roll shafts be interconnected by idler gears. The lower roll shafts are geared together with the same arrangement of idlers, and each pair of upper and lower idlers mesh together. The last, or low speed, spur gear of the gear reduction outside the outboard housing is keyed onto the extension of the first lower driving roll shaft, as shown in Fig. 3. With this arrangement all six driving rolls are power-driven, with the gears in proper mesh regardless of the setting of the rolls for different sizes and varying thicknesses of angles.

The screw-down on each upper outboard bearing is kept in vertical alinement with the other two bearings by means of a compression spring under the journal box. One of these springs is shown at the right in Fig. 1. Bending of the shaft is thus practically eliminated. This layout has proved to be most satisfactory under all conditions of operation.

It will be noted by reference to Figs. 1 and 2 that the various adjustments and controls for the setting of the driving and straightening rolls, as well as the gages and the hand wheels for controlling the cutting tools, are all within convenient reach of the operator on the operating side of the machine. It is also advisable that the motor controller be located within easy reach.

It will be seen from the illustration that the base casting of the machine is arranged so that the outer housing on the operator's side can be slid out beyond the end of the roll shafts, without being removed from the base of the machine. This arangement gives easy access to the upper and lower driving rolls, in case it is desired to smooth them up without removing them from the shaft, or for taking them off in order to replace them with new rolls. All bearings are provided with sight feed oil cups, so that the operator can see to the proper oiling of the bearings without the necessity of having to stop the machine on this account.

The capacity of this machine for handling all sizes of angles, without the necessity of any change of set-up for different sizes and thicknesses of angles, except the adjustments for which the machine is arranged and which are easily and quickly made, makes this angle planer suitable for handling all work in the average shipyard; and with the output that it is possible to obtain, one machine is all that is required, unless the installation of two machines is dictated by the plant lay-out to obviate the necessity of transferring material from one location to another, as would be required in a large shipyard where all of the angles to be planed would have to pass through one machine.

Marine Terminals as Municipal Investments

Reports from Sydney Harbor Trust from 1901 to 1918 Show Working Expenses 26.19 Percent of Gross Receipts—Even Better Results Possible

BY H. MCL. HARDING*

BONDS issued by cities for the improvement of port terminals are in the same class as water bonds, inasmuch as such terminals can earn the interest on the bonds and provide for maintenance, amortization and working expenses, and in addition leave a surplus for further waterfront improvements.

This has been clearly demonstrated at foreign ports, among which is the port of Liverpool. It is, however, preferable to take as examples port terminals which are similar to what American terminals would become under like circumstances, such as the duration of the terminal existence, density of population, language and methods of operation, and especially what has been the experience under the late war conditions. It is desirable to know what would be the effect of a war on a port terminal investment.

English Colonial Ports

Fortunately we have English colonies, the ports of which may be studied to advantage, which are of comparatively recent origin and which have just passed through a war never before equaled as to its strain on financial resources, stoppage of shipping and severity of operating conditions, the last due to labor strikes and other difficulties.

Among these colonial ports may be mentioned the Port of Sydney, New South Wales, Australia, as an example. Its records, data and the financial results from its inception in 1901 to June, 1918, are of great value as a forecast of what may be expected in the development of most American ports in respect to gross and net revenues, proportional capital expenditures, wharfage and other rates, renewals and replacements, wharves, sheds and warehouses, tonnage and berthing, and transshipment. These records are indicated upon charts year by year from June, 1901, to June, 1918, and a combined diagram for all these years is shown in Fig. 2.

Revenue and Expenditures at Port of Sydney

The following figures, more in detail, are from June, 1917, to June, 1918, and include the dark period of the

* Consulting terminal engineer, New York.

Generated on 2024-09-12 07:53 GMT / https://hdl.handle.net/2027/uiug.30112004006158
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

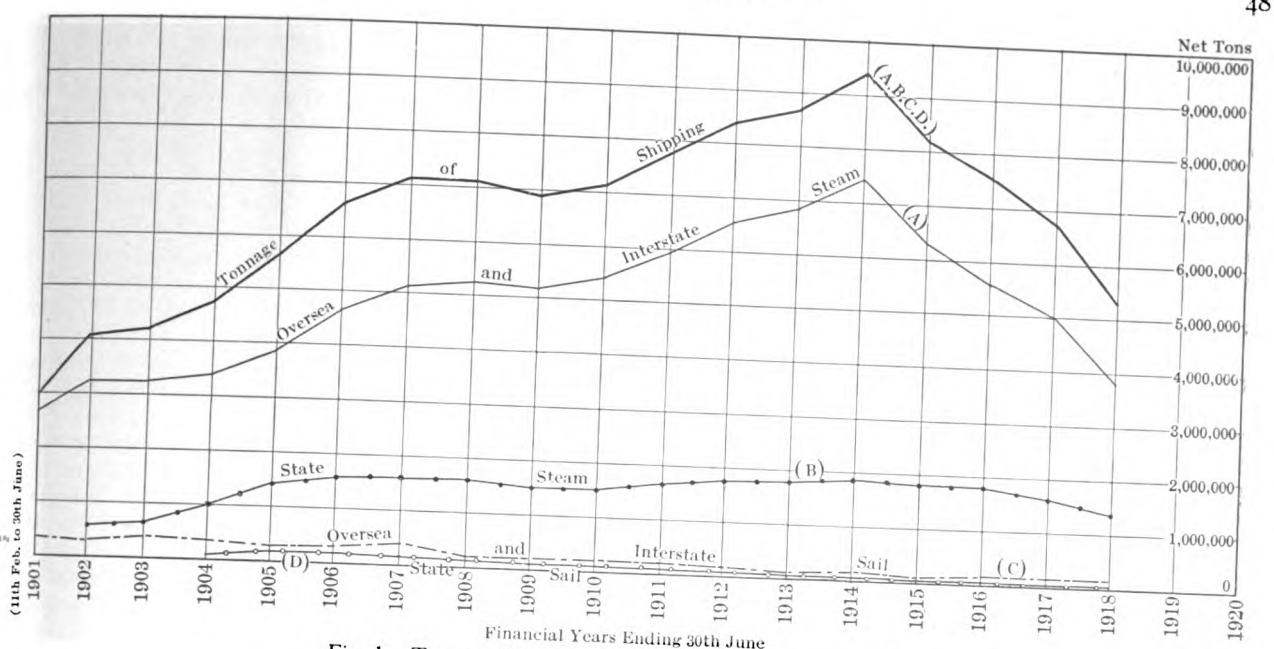


Fig. 1.—Tonnage Entered at Port of Sydney from 1901 to 1918

great war. The figures are so complete that they should be of instructive value to all American port authorities.

The revenue collected during the last year to June, 1918, amounted to $2,820,000 (£576,459 3s. 8d.). Working expenditures, including salaries, amounted to $740,000 (£151,016 15s. 4d.), or only 26.19 percent of the above gross income. Renewals and replacements amounted to $94,600 (£19,387 4s. 9d.).

The surplus for the year's transactions after deducting $94,600 (£19,837 4s. 9d.) amounted to $282,000 (£57,583 5s. 9d.). The gross revenue was 6.68 percent on capital, and the net revenue, 4.89 percent.

The above figures indicate a satisfactory year from the revenue point of view, even though it was under war conditions and there was a long strike period. It was found necessary, due to the war, to increase the wharfage rates somewhat. The number of vessels entering the port during the year ending June 30, 1918, was 7,535, with a gross registered tonnage of 9,058,568 and a net tonnage of 5,320,400. The goods imported amounted to 3,447,656 tons. The value of imports into Sydney was $270,000,000 (£55,371,749), and of exports, $177,000,000 (£36,289,589). There was expended in completion of works which had been commenced before the war $1,025,000 (£209,851).

Figures are available giving in detail all of the above

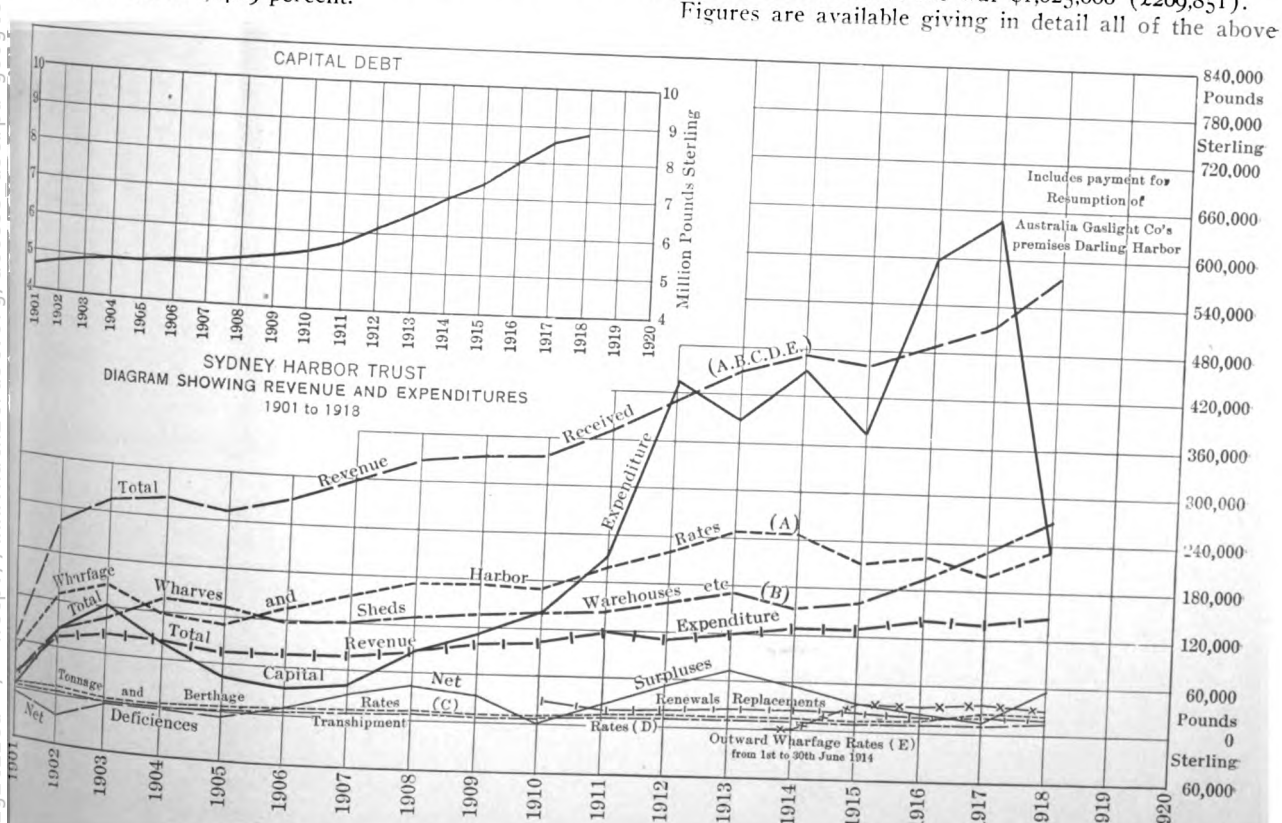


Fig. 2.—Diagram Showing Revenue and Expenditures of Sydney Harbor Trust 1901 to 1918

Generated on 2024-09-12 08:00 GMT / https://hdl.handle.net/2027/uiug.30112004006158
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

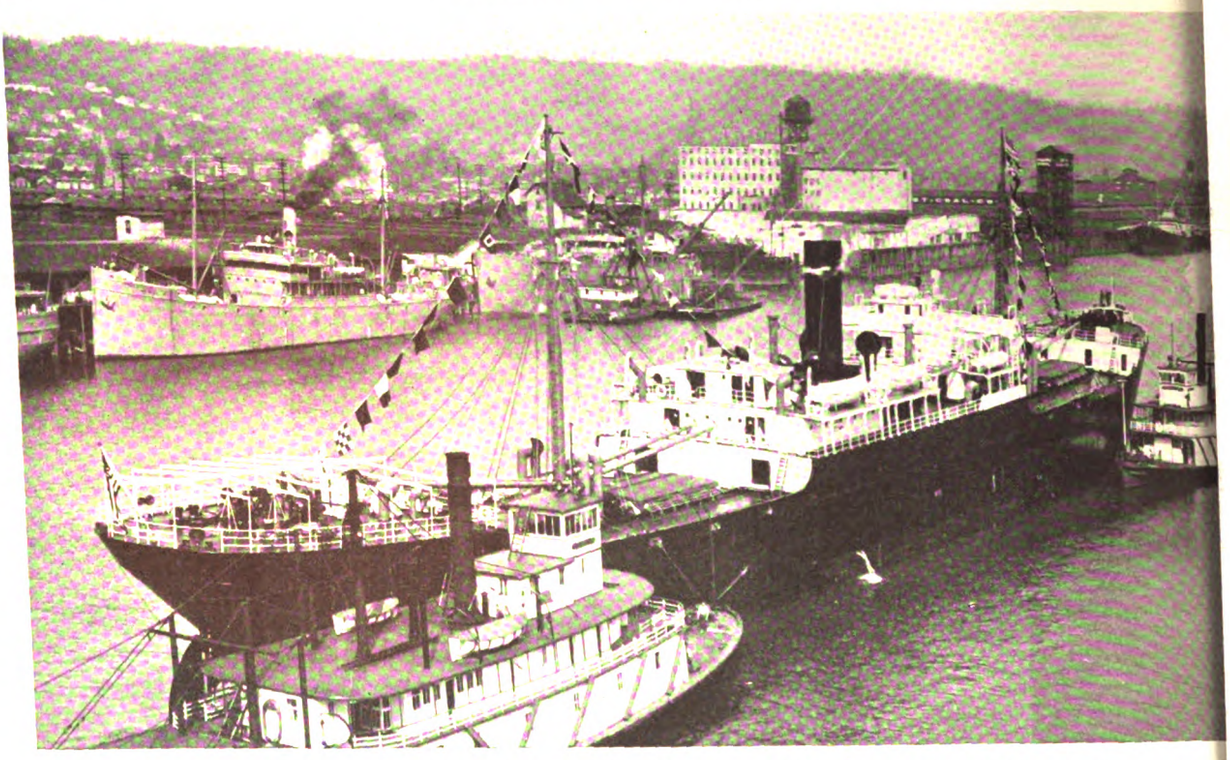


Fig. 1.—S. S. *City of Eureka*, Built by Columbia River Ship Building Corporation in 37 Working Days

Pacific Coast Yard Builds 8,800-Ton Freighter in Thirty-Seven Days

THE Columbia River Ship Building Corporation, Portland, Ore., established recently a record in ship construction by completing the 8,800-ton freighter *City of Eureka* in thirty-seven, sixteen-hour working days. The keel of the vessel was laid April 4, 1919, and on May 22 the completed ship was given her trial run.

Photographs taken during the progress of the work show the remarkable speed with which the ship was assembled and fitted. On April 4, the keel was laid; by April 8, all floors were in place; on April 14, the frames were erected; on April 23, the second deck plating had been riveted into place, and the pillars and girders were in position for the main deck; on April 25, the superstructure had been riveted and finished. On May 8 the ship was launched after exactly twenty-seven working days, which is probably the shortest time taken by any

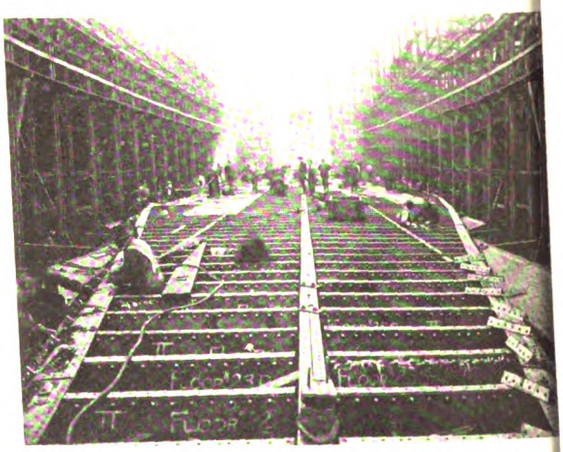


Fig. 3.—Floors in Place by April 8

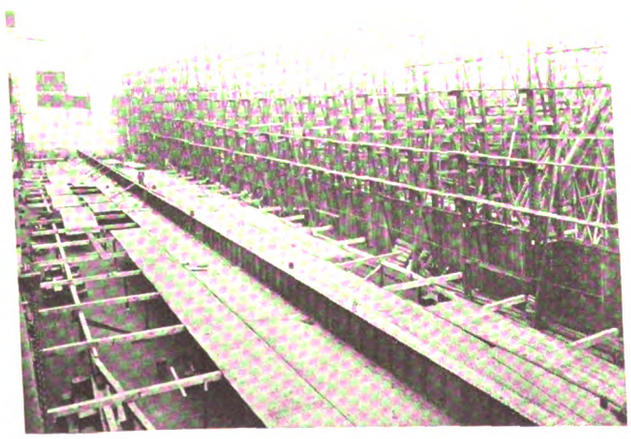


Fig. 2.—Keel Laid on April 4

Fig. 4.—Frames Erected on April 14

Generated on 2024-09-12 08:06 GMT / https://hdl.handle.net/2027/uiug.30112004006158
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

ging Finished on May 16

eight-ton type, having
veen perpendiculars, a
l depth at the lowest
es, and a draft of 24
urn oil, and is driven
ectric turbine, geared
opeller. Three marine
he same corporation.
ock construction and
vessel, were produced

—

no, Sweden

s, were launched at
1918. The yard has
standard type, one for
form, of Copenhagen.
eadweight, which was
been delivered to the
y, of Goteborg. Two
nstruction at Oresunds
jöfarts Company for
of 1,850 tons are also
ction. The second of
as launched in March.
Steamship Company,
has bought from Vik-
Company, of Gote-
teamers—*Dettern*, of
Huskin, of 1,250 tons;
00 tons, and *Neptunus*,

merchant fleet de-
1918 by 13 vessels of
These vessels were sold
Norway and north
s. Shipping interests
g are negotiating for
f 20 additional vessels.

IRING ON BOARD SHIP.
000-ton freight ship
eet of electric wiring
in sizes varying from
d S. gage to No. 0.
. and S. gage is used
mmunication.

Generated on 2024-09-12 08:04 GMT / https://hdl.handle.net/2027/uiug.30112004006158
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Fig. 1.—

Pacific Coast Freighter ir

THE Columbia F
Portland, Ore.,
ship construction by
City of Eureka in thirt
The keel of the vessel
22 the completed ship

Photographs taken
show the remarkable
sembled and fitted. C
April 8, all floors wer
were erected; on Apr
been riveted into plac
in position for the m
structure had been ri
ship was launched af
days, which is probal

Fig. 2.—

Generated on 2024-09-12 07:49 GMT / https://hdl.handle.net/2027/uiug.30112004006158
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from
UNIVERSITY OF ILLINOIS AT
URBANA-CHAMPAIGN

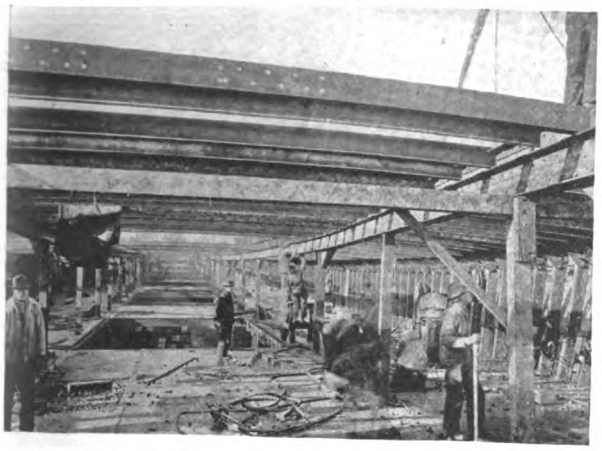


Fig. 6.—Main Deck Girders in Place on April 23

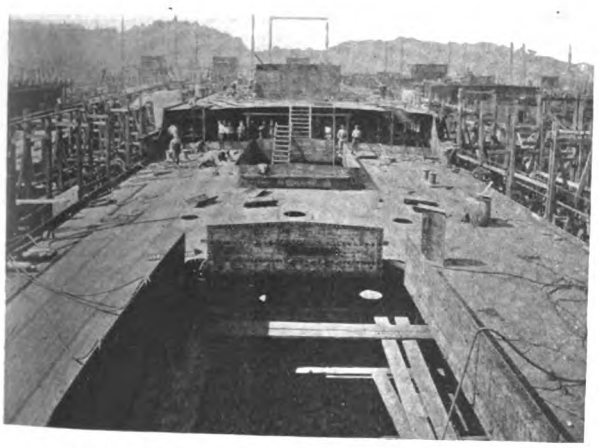


Fig. 7.—Superstructure Finished on April 25

American concern for similar construction. Between this date and May 16 the boilers and engines were completed, all deck work, stacks and rigging erected, so that by May 22 the ship was towed down river for her trials.

Fig. 8.—Vessel Launched on May 8, Twenty-seven Days After the Keel was Laid

Fig. 9.—Mrs. Alfred F. Smith, Sponsor of the Vessel

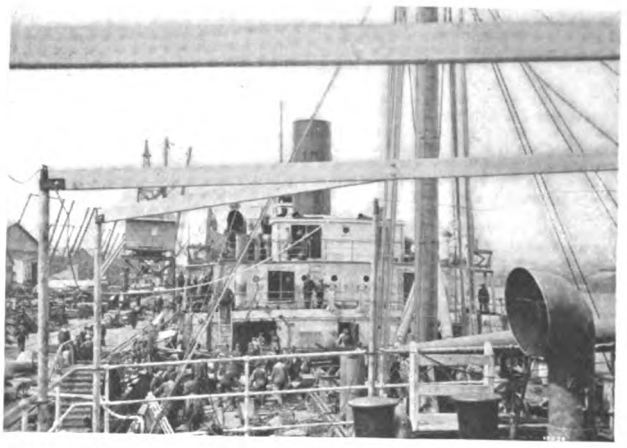


Fig. 10.—Machinery on Board and Rigging Finished on May 16

The vessel is of the 8,800 deadweight-ton type, having a length of 410 feet 5½ inches between perpendiculars, a molded beam of 54 feet, a molded depth at the lowest point of sheer of 29 feet 10 inches, and a draft of 24 feet 2 inches. She is equipped to burn oil, and is driven by a 2,500-horsepower General Electric turbine, geared to a 17-foot, four-bladed, bronze propeller. Three marine Scotch boilers, manufactured by the same corporation, are installed. All joiner work, stock construction and breeching in connection with the vessel, were produced as well.

Shipbuilding at Malmo, Sweden

Nine vessels, including warships, were launched at Stockums Wharf at Malmo during 1918. The yard has under construction two vessels of standard type, one for Göta, of Goteborg, and one for Gorm, of Copenhagen. The steamer *Freja*, of 2,300 tons deadweight, which was launched at Linhamns Wharf, has been delivered to the owners, Travers Steamship Company, of Goteborg. Two steamers of 4,000 tons are under construction at Oresunds Wharf for Svenska Handels & Sjöfarts Company for transatlantic trade. Three steamers of 1,850 tons are also under construction. The second of these boats was launched in March. The Hallandia Steamship Company, of Halmstad, has bought from Viking Steamship Company, of Goteborg, four steamers—*Dettern*, of 1,600 tons; *Ruskin*, of 1,250 tons; *Barken*, of 1,500 tons, and *Neptunus*, of 1,700 tons.

The Malmo merchant fleet decreased during 1918 by 13 vessels of 21,519 tons. These vessels were sold to Denmark, Norway and north Swedish ports. Shipping interests in Helsingborg are negotiating for the purchase of 20 additional vessels.

ELECTRIC WIRING ON BOARD SHIP.—For an 8,000-ton freight ship about 9,500 feet of electric wiring will be used in sizes varying from No. 16 B. and S. gage to No. 0. The No. 16 B. and S. gage is used for interior communication.

Generated on 2024-09-12 08:02 GMT / https://hdl.handle.net/2027/uiug.30112004006158
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

A Cost System for Shipyards

Uniform Methods of Cost Accounting Advocated—Costs Defined—Structural Classification—Labor and Material Charges

BY CREIGHTON CHURCHILL*

THE necessity for a thorough and simple method of cost finding in the shipbuilding industry is generally recognized. This need is in evidence more particularly in the newer yards, which have hardly been in existence a sufficient length of time to derive the natural benefits of a perfected organization. The greatest danger from the lack of an accurate knowledge of costs is the demoralizing effect produced on the industry as a whole when it is building ships on a competitive basis. The yard which is in possession of an actual knowledge of costs is liable to be underbid by a competitor which is not in possession of such knowledge to the detriment of both—one loses the business and the other loses money. In the latter case, where the low bid may be below cost on account of the lack of adequate cost finding methods, the purchasers of these low-priced ships may benefit for a time, but eventually the losses will be greater than the funds which are available to pay them, and the yard will cease to do business when that time arrives.

In similar lines of industry, as a matter of self-protection, the tendency of the times is toward uniform methods of cost finding. Where associations of manufacturers have recognized this fact and have been successful in arriving at a satisfactory solution of the problem, the benefits have been very marked, and in many cases have pointed the way to faults in management and methods which otherwise might have failed to come to the surface. The very least that can be said of a uniform cost method in any particular industry is that it prevents ruinous competition due to ignorance, and eventually will bring about the survival of the fittest, or, what amounts to the same thing, make the unfit see the error of their ways.

An indirect but very important result of a comprehensive knowledge of costs, derived from a logical system applicable to a particular industry, is the possibility of measuring the efficiency both of the work of individual men and departments and of the yard as a whole, provided that the data accumulated are properly used. In the final analysis, costs determine the success or failure of a business. If accurate costs are presented to executives in a timely and tell-tale way, many a fault can be corrected at its start rather than after the damage is done. In other words, an up-to-date system should provide immediate and adequate records which are not mere history, written up a long time after the event has transpired. At the present time it is common practice for many concerns to sell their product at prevailing market prices because they never know exactly what that product costs for weeks and sometimes months after the books have been closed for the year. Their costs are averaged against output and inventory is taken once a year, all of which tends to uncertainty. This method of cost finding is now generally looked upon as inefficient and even hazardous under certain conditions. An up-to-date cost system usually goes beyond the mere function of determining costs by providing the means of accounting for work in process, which, coupled with a perpetual inventory, permits a statement of the business to be made monthly or quarterly, as may be desired.

* Member of firm of Churchill & MacLeod, New York.

Another feature of a well-designed cost system that appeals to the progressive executive is the information which is available when a plant is operating below its normal capacity. It then becomes necessary to reduce the margin of profit in order to attract more business rather than have the business already acquired absorb the expense of idle equipment. Nothing eats into the profits of an industry more than idle equipment, hence the cost of such idle equipment should be an open book and used to the fullest extent. This feature will be more fully discussed under "Overhead."

Aside from the current information furnished by a cost system, it should also provide the necessary data for cost analyses covering the various classes of output or the various parts of an assembled product. Such analyses are often productive of radical changes in policy. They may show where certain parts can be bought outside more cheaply then they can be made, or, on the contrary, it may be evident that it would be a good investment to equip the plant for manufacturing certain parts rather than to purchase them outside.

Cost accounting is or should be distinguished from general accounting. In too many cases cost methods have been developed from a purely accounting point of view, partly or totally ignoring the operating or engineering element involved—a case of the tail wagging the dog, so to speak. As a matter of fact and common sense, a cost system should be built up to suit a particular industry and then tied in with the general accounts to complete the financial records. Inasmuch as every industry is carried on through some sort of an organization which provides for dividing up the activities in accordance with the make-up of the output, and, as these activities are the source of all charges against such output, it would appear logical to use the organization as the basis for a cost system. Such procedure will enable any yard to apply to its particular organization the system herein developed by making the necessary changes in detail. Furthermore, the application can be made without any confusion when the preliminaries are completed. If generally adopted, the solution of uniform costs in the shipbuilding industry would be the very simple matter of accumulating cost data according to the accepted rules and regulations.

Uniformity in Methods

To obtain the full advantage of uniform cost methods in any industry it is of the greatest importance to agree upon uniform terminology and to decide what disposition is to be made of the various items of labor, material and overhead which make up the final costs. Little or no difficulty presents itself in disposing of direct labor and direct material costs. Such, however, is not the case with overhead, an item which may be treated in a variety of ways. In the shipbuilding industry it is customary to consider overhead as a certain percentage of direct labor. This is open to objections for several reasons, but primarily because such a custom, while undoubtedly including all items in the final cost, does not tell the true story of the day-to-day operation of a plant, nor does it indicate specifically the particular accounts among which the overhead should

Generated on 2024-09-12 07:50 GMT / https://hdl.handle.net/2027/uiug.30112004006158
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

be apportioned and whether or not this distribution, if made, is excessive in regard to any one account. In other words, it is treated simply from the accounting rather than the operating point of view. It would appear, therefore, that before much headway can be made on a uniform cost system it will be necessary to give a comprehensive definition of costs to be supplemented by a structural classification such that all types of ships can and will be included.

Overhead is always a bone of contention and will not be discussed at length. Suffice it to say that the distribution of overhead as a percentage of direct labor, the usual method employed by shipyards, is open to serious criticism. In order to get a better and more correct distribution, it is a much better practice to locate overhead at its source as far as possible, with special reference to indirect labor and depreciation. In this connection it might be well to mention that idle equipment due to lack of business should be a profit and loss charge and not an overhead charge, otherwise many a contract will be lost in competition with a yard that is fortunate enough to have a normal capacity business on its books. This is plain common sense, if viewed from the proper angle, for it may well mean the difference between a small profit and an actual loss. In fact cases are of record where a certain loss was turned into a profit by taking a new contract at actual cost, all of which was due to no other cause than the absorption by the new contract of the overhead through use of what otherwise would have been idle equipment.

Locating overhead at its source offers no difficulties from a cost accounting point of view. It simply means that the various plant structures and their equipment should be appraised at their proper value and charges for depreciation and maintenance made accordingly. The indirect labor cost is simply a matter of making a charge to a standing order which automatically goes into overhead through control accounts. Not the least advantage of such a method is the opportunity it gives executives to locate and give their attention to the high points in operating expenses.

In addition to the costs by structural classification, shipbuilders usually want to know the costs by crafts, such as riveting, shipfitting, etc. This can be taken care of by a simple system of using workmen's numbers in combination with shop symbols for the designation of individual charges, so that the desired costs may be allocated by sorting out the charge numbers covering the cost in question. In this connection tabulating machines will pay for their use many times over, and, in addition, will afford opportunities for cost and production analysis that otherwise might appear almost hopeless to obtain.

In the process of arriving at final cost, unit costs can be established for all of the work and output of a yard. This brings up the question of determining proper units in order to utilize cost information for estimating. It is not believed necessary to outline a system of units, though it is suggested that certain standard units be fixed and that suitable factors be developed to make these units applicable to changed conditions. For example, should the unit cost of erecting a ton of steel be taken, it will vary inversely as the weight of the steel per square foot which is the basis for specifying shell plating. This, of course, is on the assumption that the labor cost for erecting a 4-foot by 12-foot 20-pound plate is practically the same as for a 4-foot by 12-foot 30-pound plate.

DEFINITION OF COSTS

1. *Direct Labor*

All direct labor employed in construction of vessels, including quartermen, leading men and gang foremen, who are directly chargeable to such construction, but not including labor of an indirect or supervisory nature.

2. *Material*

All direct materials, machinery and equipment incorporated in the vessels or required to be furnished at net cost, f.o.b. yard.

3. *Overhead*

All indirect labor and material necessary to operation and maintenance of plant, including power, heat and light and supervisory labor.
Executive and department head salaries.
Clerical and drafting room salaries, except where the latter can be charged directly to a specific job or contract.
Plant, builders' risk and liability insurance premiums.
Taxes, ex-corporation and federal.
Depreciation.
Rent of equipment.
Registration, inspection fees, etc.
Cost of molds, templates and designs when not chargeable to specific job or contract.
Reasonable allowance for spoiled work.
Office expenses, including supplies, telegraph and telephone service.
Transportation for employees.
Welfare work, including restaurant losses within reason.
Travel expense.

The following are not to be included in overhead, but are to be directly chargeable to profit and loss, the proper reserve account or to capital investment:

Advertising and selling expense other than executive and department head salaries.
Collection expense or bad accounts.
Legal expense other than executive and department head salaries.
Research expense.
Expenses, bonuses or commissions for sale of stock or bonds.
Interest charges on bonds or other indebtedness.
Entertainment expense.
Donations or bonuses in addition to salaries.
Replacements or extraordinary repairs.

STRUCTURAL CLASSIFICATION

Ship costs vary considerably, depending on the type of ship being built; yet all types of ships are subject to a very close and specific structural classification for cost purposes. Another purpose for which costs must be obtained is the preparation of estimates to be used in obtaining new business on a competitive basis. If, therefore, the actual costs and estimates can be combined so that the structural classifications for the former can be utilized for the latter, not only will time be saved but the cost records accumulated will be in such shape that they can be used directly for estimating. As these records have been prepared by the cost accounting department, which is the department most versed in the knowledge of all ship costs, it naturally follows that this department is the logical place for the preparation of estimates rather than the engineering department, although the data on which the estimates are based must of necessity be prepared by this latter department. To get back to the main idea, however, the following structural classification for costs and estimates applies to any type of vessel, but must be

Generated on 2024-09-12 07:52 GMT / https://hdl.handle.net/2027/uiug.30112004006158
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

supplemented by general specifications covering dimensions, cargo capacity, passenger accommodations, classification, etc.

The three general headings for classification are hull, operating equipment and machinery, each of which is subdivided into its component parts, and these in turn further subdivided into the units which make up the part.

1. *Hull*
   - (a) Main steel structure.—Scantlings, keel, stern frame, bulkheads, shell plating, engine and boiler foundations, etc.
   - (b) Secondary steel structure.—Engine and boiler casings, deck houses, tanks and swash plates, foundations for auxiliary machinery, cargo hatches, masts and booms, etc.
   - (c) Hull fittings.—Hawse and chain pipes, boat and anchor davits, ventilators, manholes and scuttles, bitts, chocks, etc.
   - (d) Carpenter work.—Calked decks, hatch covers, cargo battens, ceiling, boat chocks, etc.
   - (e) Joiner work.—Beam capping, side ceiling, bulkheads and partitions, doors, stairs and ladders, grab rails, interior finish, fixed furniture, gratings, etc.
   - (f) Cementing, painting and deck covering.—Cementing, bituminous coatings, hull painting, tiling, linoleum and floor composition, etc.
2. *Operating Equipment*
   - (a) Hull equipment.—Standing rigging, cargo gear, anchors, chains, cables, hawser, running rigging, boat falls, boats, rafts, fire buckets and axes, fire extinguishers, running lights, nautical outfit, etc.
   - (b) Furniture and furnishings.—Desks, chairs, lockers, berth, springs, safes, etc.
   - (c) Outfits.—Deck, carpenters, lamps and lamp room, paint and oil room, galley and pantry, mess outfits, carpets and rugs, mattresses and pillows, blankets and linen, etc.
3. *Machinery*
   - (a) Hull machinery and hull engineering.—Windlass, capstans, cargo hoisting engines, steering engine, fire main and deck wash systems, bilge and ballast piping, cargo oil piping, sanitary system, plumbing fixtures, electric plant, heating, refrigerating plant, ventilation, exterior and interior communication, pipe covering, etc.
   - (b) Propelling machinery.—Main engines or turbines and reduction gears, main condenser, line and thrust shafts and bearings, stern tube, lubrication, propellers, gages, instruments, clocks, lifting gear, attached pumps, independent pumps, evaporator and distiller, auxiliary condenser, feed water heater, main boilers, donkey boiler, piping, machine tools, engine and fireroom outfit and tools, consumable stores, etc.

By using such a classification and carrying the subdivisions to the extent demanded by good practice, costs can be assembled to any degree of refinement. Each subdivision is made up of material, labor and overhead if it is produced at the yard. Items which are purchased outside should be charged into general or contract stores when they are received and then should be charged out against a specific hull when they are issued from the stores. This applies to hull steel just as well as to any other direct material, on the theory that until it is issued no material is charged to a vessel under construction, although it was specifically purchased for that vessel. If material were not charged in this way, it would be almost impossible to get an accurate account of work in process without an actual physical inventory.

LABOR AND MATERIAL CHARGES

Charges for direct and indirect labor, other than salaried employees paid on a weekly or monthly basis, are covered by time cards or work tickets, clock cards or a check system or combination of these. Irrespective of the method used, it is important that all direct and indirect labor be accounted for in hours, whether it be on a day work or piece work basis. The necessity of accounting for labor in hours arises from the fact that the man-hours required to complete a definite amount of work have a direct bearing on the estimated time of its completion, and this knowledge, other things being equal, is extremely valuable in the preparation of estimates which are to be used for competitive bidding.

It is recognized that the actual form of time cards, work tickets, material orders, repair orders and any other means of accumulating records of labor and material which have been expended on output or in the maintenance of the plant is not important as long as all the required information is recorded in such shape that it can be utilized for cost purposes as well as to furnish the necessary data for making up the payroll. No attempt will therefore be made to draw up such forms, but the information required thereon is listed as follows:

Time Cards of Work Tickets

1. Date.
2. Department or shop by symbol.
3. Man's number.
4. Hull number and job order number.
5. Hull section or berth number.
6. Description of work.
7. Hours worked, quantity of work, rate and amount.
8. Signature of timekeeper or supervisor.

Material Orders

1. Date.
2. Department, shop, hull number or job order number for which wanted.
3. Description of material and quantity wanted.
4. Amount issued, unit price and extension.
5. Stores classification receiving credit.
6. Department or shop of origin and signature of proper authority.

Repair Orders

1. Date.
2. Description of work.
3. Department or shop charged and standing order number.
4. Labor cost, material cost and total cost.
5. Department or shop of origin and signature of proper authority.

   NOTE.—If a replacement charge, so note on face of order.

Job Orders

1. Date.
2. Department or shop to which issued.
3. Hull number or job order number.
4. Description of work and amount wanted.
5. Drawing number, part number.
6. Material and amount required.
7. Date wanted.
8. Department or shop of origin and signature of proper authority.

(*To be continued.*)

Generated on 2024-09-12 07:50 GMT / https://hdl.handle.net/2027/uiug.30112004006158
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

The Cost of Manufacturing Ships

Method of Determining the Cost Per Deadweight Ton of Vessels Under Construction from Weekly Production Reports

BY FREDERICK THORNE WARNER*

ONE of the most important questions that confronts the shipbuilder of to-day is, probably, "What is the present cost to me of manufacturing ships?" It is not enough to know what No. 1 or No. 6 ship costs, as a great deal of their construction was done during a period of less efficiency—possibly overtime, etc. He must know his current cost.

This is an especially pertinent question in the newer yards where a greater difference in costs is being effected weekly—and the relative differences between the costs of each ship are so great, but obtained so late. A large proportion of these newer yards are building ships of the same type and at present have ships in all stages of construction. It is to yards in this class and under the conditions stated that this discussion is primarily intended to apply.

In a yard building ships of the same type and with ships in all stages of construction, it is possible by using weekly reports on production to consider that the work was all done on one ship, and by so doing to obtain the ships per year at the rate of the week in question. This easily resolves itself into deadweight tons per year, etc., which is probably quite common data in shipyards and has been useful in the past in showing the speed. In this discussion it is attempted to arrive at the cost of a deadweight ton at the rate of the week in question. The chart shown in Fig. 1

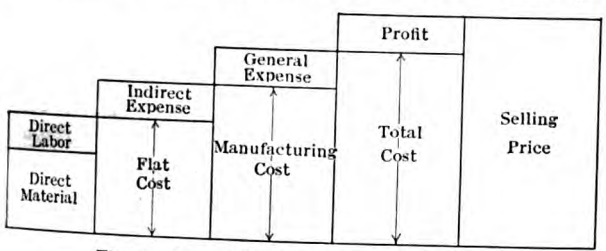


Fig 1.—Chart Showing Separation of Costs

will give an idea of the common practice in the separation of costs, to which we will refer later.

For the purposes of this discussion the question of profit will not be considered, and manufacturing and general expense will be grouped. Therefore we will take three items:

(1) Direct Material
(2) Direct Labor
(3) Overhead

First.—On the date of writing it is safe to assume that one ship has already been delivered and that the detailed bills of material have been priced to such an extent that even with additions and deductions the direct material cost of a ship is accurately known.

Second.—The direct labor we will obtain from our accounting department.

Third.—The overhead we will obtain from our accounting department.

Armed with these data we will proceed as follows: Production report for week ending May 10 shows:

Rivets driven	100,000
Tons erected	400
Tons fabricated	500

* Production engineer, Groton Iron Works, Groton, Conn.

Basis of rivets driven (assuming 600,000 rivets in ship)

$$\frac{100{,}000}{600{,}000} = \frac{1}{6} \text{ ship, or } \frac{52}{6} = 8.66 \text{ ships per year.}$$

Basis of tons erected (assuming 2,600 tons to be erected in ship)

$$\frac{400}{2{,}600} = \frac{2}{13} \text{ ship, or } \frac{52 \times 2}{13} = 8 \text{ ships per year.}$$

Basis of tons fabricated (assuming 2,600 tons to be fabricated for ship)

$$\frac{500}{2{,}600} = \frac{5}{26} \text{ ship, or } \frac{52 \times 5}{26} = 10 \text{ ships per year.}$$

In an attempt to weigh these items with some degree of accuracy and by considering their relative costs and the work required before each of these operations can be performed we have given the following values:

Riveting	45 percent
Erecting	35 percent
Fabrication	20 percent

Therefore we have by

riveting	8.66 × .45	= 3.9
erecting	8 × .35	= 2.8
fabricating	10 × .20	= 2.0

and on all items considered, 8.7 ships per year.

In connection with the weight assumed, it should be noted that almost any approximation will compensate in a long run, but consideration regarding the weight is necessary for weekly comparisons.

In regard to the number of items of production considered, i.e., riveting, erecting and fabricating, it may be said that these will not be a fair guide in the production of ships when the installation of machinery, joiner work and piping are such important factors. It must be remembered that we have considered only "ships in all stages of construction." Therefore our assumptions are not unsafe, but if some scheme can be devised to secure definite unit measures of production (not labor hours consumed) in wood work and machinery installation, and such are quite possible to approximate with sufficient accuracy for the result, then our solution will be the better for it. As it is, we will be incorrect in our deductions only if outfitting, say, is stopped for the week in question or if some structural work is stopped, or very much unbalanced conditions exist. If the yard is quite small and the work is unbalanced, the monthly check on the same basis will be better. However, in a yard with six ways or over, producing six ships per year or over, the weekly basis will, in 90 percent of the weeks taken, be satisfactory.

Assume the direct material for one ship costs $500,000. At the week in question we would have used

$$\frac{\$500{,}000 \times 8.7}{52} = \$83{,}654 \text{ worth of material.}$$

Added to this, and the direct labor payroll of $100,000 and overhead of $50,000, or $100,000 plus $50,000 plus $83,654 equals $233,654, which is the total cost of manu-

Generated on 2024-09-12 07:49 GMT / https://hdl.handle.net/2027/uiug.30112004006158
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

facturing $\frac{8.7}{52}$ ships during the week in question.

Assuming 8,800 deadweight tons per ship, we have $\frac{8.7 \times 8{,}800}{52} = 1{,}472$ deadweight tons completed during the week for $233,654, or $\frac{233{,}543}{1{,}472} = \$158$ per deadweight ton.

With this figure weekly, or in a smaller yard monthly, the manager can see for what figure new contracts may

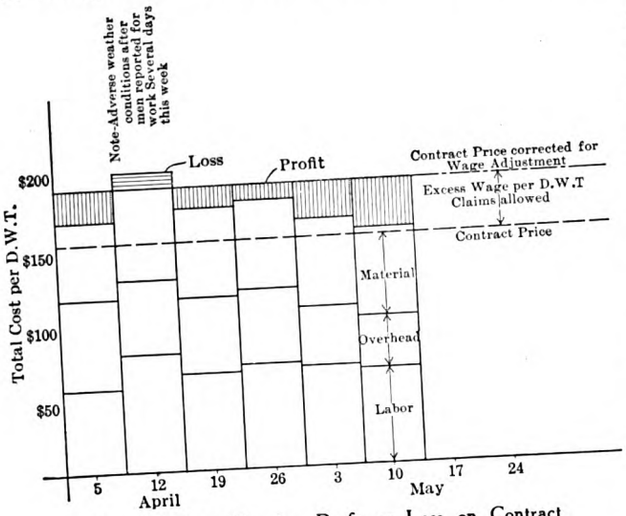


Fig. 2.—Chart Showing Profit or Loss on Contract

be taken and not wait until various ways are idle and the costs are obtained from accountants on ships as they are delivered; nor depend upon figures submitted by the more technical men who were before the war so much relied upon.

Were it practicable to break a ship down into sections and keep costs on the construction of each section, such a scheme as has been described would be unnecessary. This has been attempted many times, but without success, and the structural steel hull, representing about 70 percent of the cost, is thrown into one account, which opens with keel laying and closes with delivery. It leaves very little opportunity, therefore, for a check on current costs.

If the shipyard has contracts to fill the ways for some time to come, and it is desirable to find currently the profit or loss on the contract amount, the scheme outlined above may easily be modified to show this information (see Fig. 2).

In this connection by finding the money return to the company of each workman's efforts and subtracting the cost (in labor, overhead and material) of this man to the company, we have a profit (if plus) or loss (if minus) per man. These data are interesting when an increase or decrease of forces is going on and will enable the management to know the effects of the changes.

SHIPYARD EMPLOYMENT MANAGERS' ANNUAL MEETING.—The annual meeting of the Employment Managers' Committee of the Atlantic Coast Shipbuilders' Association was held in Atlantic City, N. J., on June 27. Among the subjects discussed were the following: Relations of the Employment Department to the Management and to the Shop Personnel; Stabilizing the Working Force; Placement of Returning Soldiers, and many other topics relating to the work of employment managers.

Electric Propelling Machinery of the Battleship Tennessee

BY WILLIAM H. EASTON

The United States battleship *Tennessee*, launched on April 30 at the New York Navy Yard, Brooklyn, N. Y., is to be the most powerful fighting machine in existence. She will be able to shoot harder and stand more punishment than anything else afloat, and her speed will be sufficient to keep her in contact with any vessel of her class.

Her overall length is 624 feet; beam, 97 feet; draft, 31 feet; and full load displacement, 33,000 tons. She will mount twelve 14-inch guns; twenty-two 5-inch guns; two 3-inch anti-aircraft guns; four saluting pieces, and two 21-inch submerged torpedo tubes. Her armor protection, which is as complete as naval science can make it, consists of a 14-inch main belt of armor, reduced to 8 inches aft, and 3 inches at the deck ends, with special protection against torpedo attack. Her complement will be 1,119 officers and men.

Propulsion is by four propellers, each driven by an electric motor, power for which will be supplied by two turbine-driven generators. The maximum power will be 33,500 horsepower, and the maximum speed over 21 knots.

The Navy Department has experimented with electric drive for several years, and has decided to use it on the new battleships because, though not especially superior in reliability, weight per horsepower, economy, and speed range to the geared-turbine drive as adopted for the 90,000 horsepower scout cruisers, its use does permit greater freedom in the design of the ship. With geared turbine, the turbines and propellers are connected together by means of shafts and gears, and there is little leeway in the location of the engine room. With electrid drive, however, the turbines and propellers are entirely separate mechanically, and the former can be placed in almost any desired location. This flexibility is of special importance in battleship construction, for it permits greater consid-

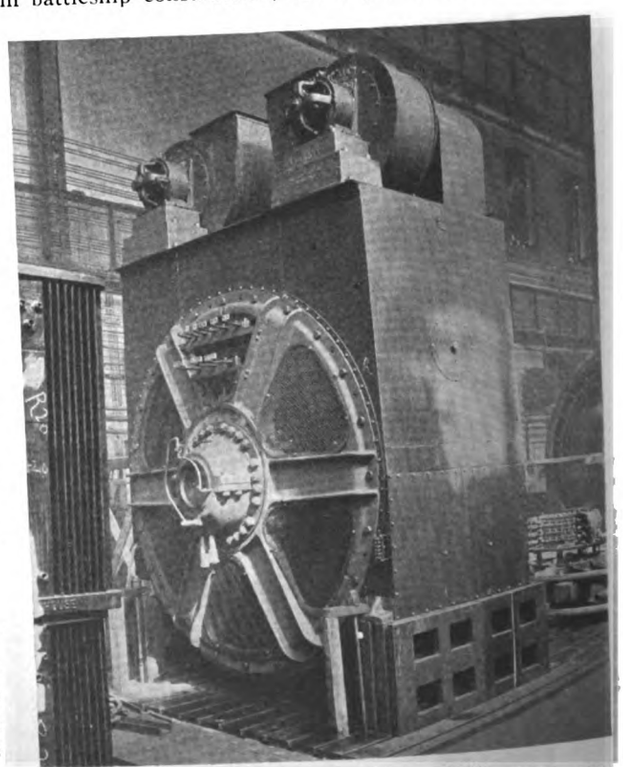


Fig. 1.—Thrust End of Propelling Motor, Showing Motor-Driven Ventilating Fans on Top

Generated on 2024-09-12 07:52 GMT / https://hdl.handle.net/2027/uiug.30112004006158
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

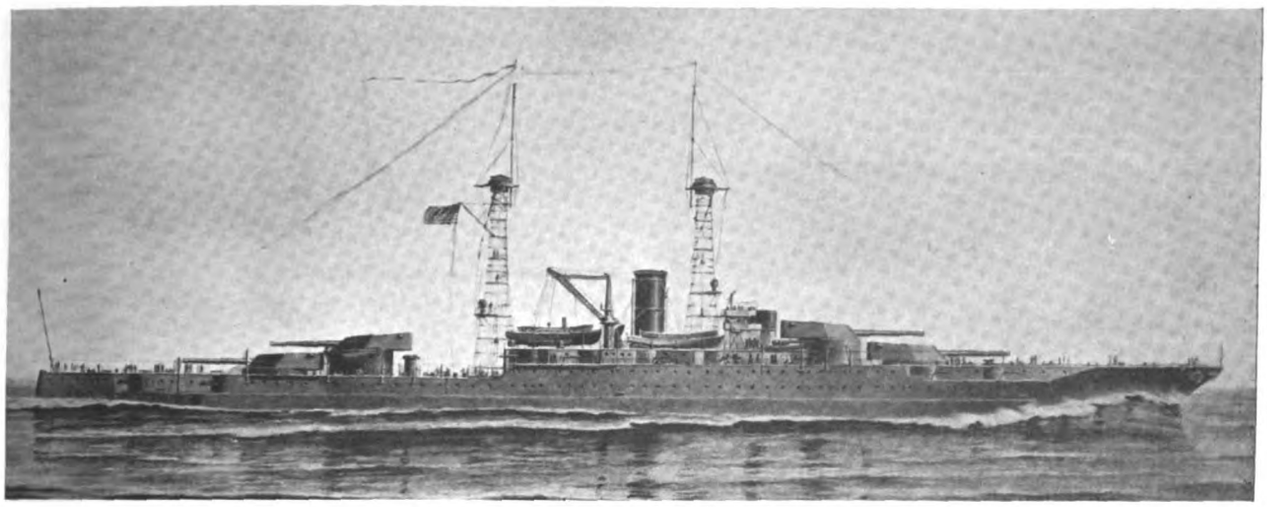


Fig. 2.—Sketch of the *Tennessee*, Made from Official Design

eration to be given to purely military factors, such as the arrangement of magazines and the protection of vital parts. In fact, owing to the freedom in the location of the bulkheads, it is possible to make an electrically-operated battleship practically torpedo proof.

In addition, the motors can be placed well aft, so that the length of the propeller shafts can be reduced to a minimum; and the turbines can be so located with reference to the boilers and condensers that the steam, oil, exhaust, and other pipe lines can be made as straight and short as possible.

THE TURBINES

The turbines of the *Tennessee* are of the Westinghouse single-cylinder, semi-double flow, impulse-reaction type. The high pressure steam first passes through a two-row impulse wheel in each turbine, and then through a section of reaction blading. It then divides into two equal parts, and each part passes through a low-pressure reaction section into the condensers.

The speed of the turbines can be varied through a range of from 1,500 to 2,270 revolutions per minute, by means of manually controlled hydraulically operated governors. The movement of the control handle varies the pressure in an oil system, and this in turn varies the loading of the governor and causes a change in speed. This system is superior to one in which the control handle and governor are mechanically connected, because there are no rods or shafts to jam where they pass through the bulkheads. A unique feature of this system is that the oil pressure is caused to pulsate, thus keeping the entire mechanism slightly in motion. This prevents sticking of the parts and adds greatly to the sensitiveness of the control, which is of great importance when ships are steaming in formation.

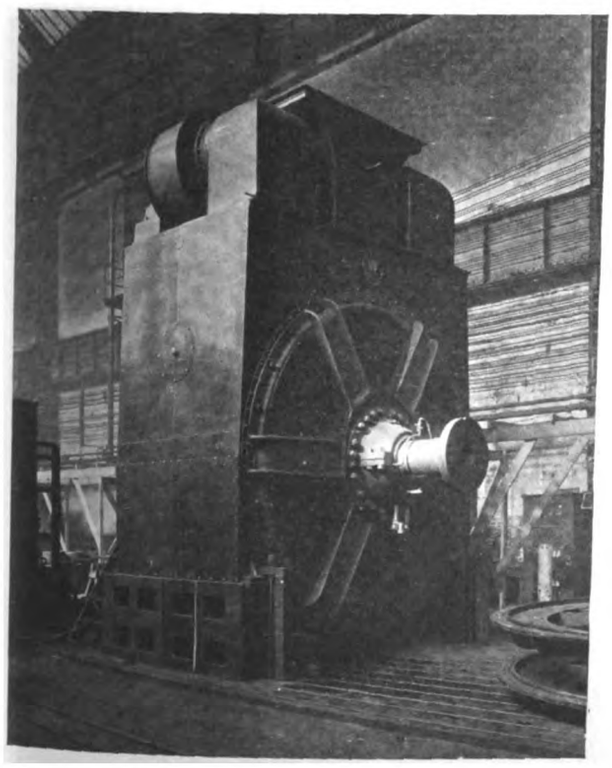


Fig. 3.—Propeller End of Motor

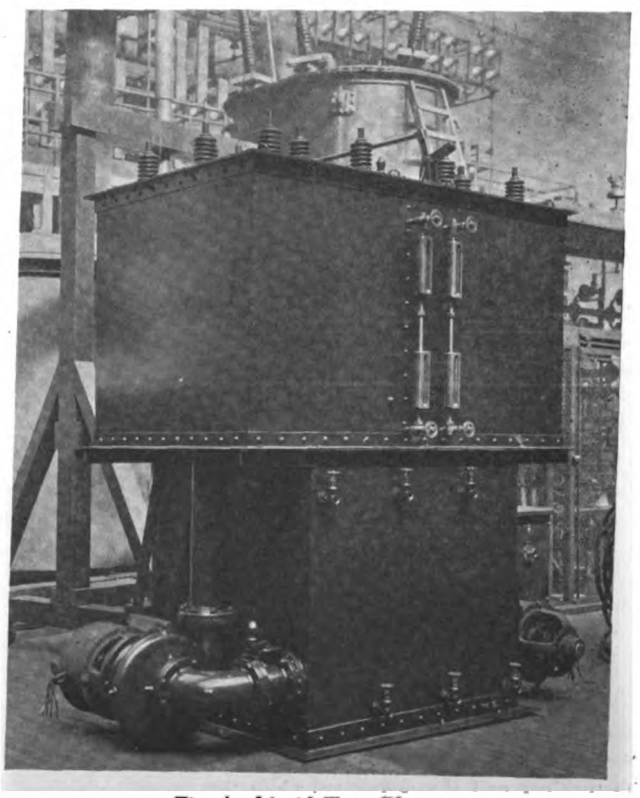


Fig. 4.—Liquid Type Rheostat

Generated on 2024-09-12 07:48 GMT / https://hdl.handle.net/2027/uiug.30112004006158
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

The speed of the turbines, as determined by the setting of the governor, remains practically constant regardless of the load, and hence the propellers do not race when they leave the water in rough weather. Automatic stops

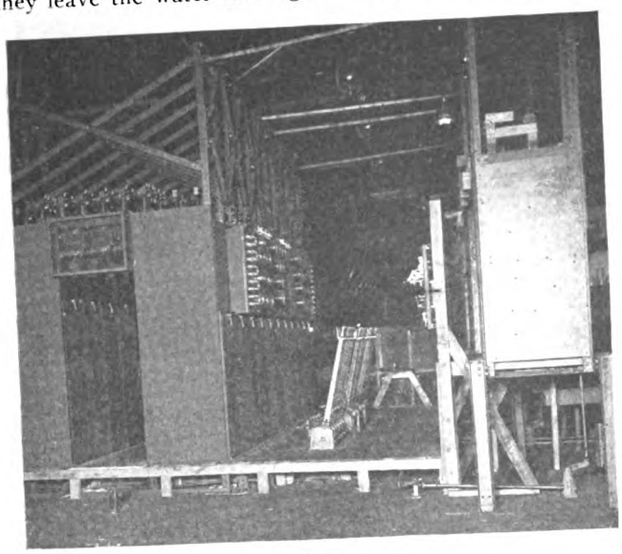


Fig. 5.—Control Station

are also provided, which cut off the steam in case the speed of the turbines exceeds a safe limit.

The Generators

The generators, which are directly connected to the turbines, are two-pole Westinghouse machines and supply the motors with 3-phase, 3,400 volt alternating current at frequencies ranging from 25 to 38 cycles, depending on the turbine speed. They are excited from the direct-current power supply of the ship, and each can develop 15,000 KVA at the maximum speed of the turbine.

The generator coils are very carefully insulated so as to prevent injury from high temperatures, moisture, and accumulations of salt. They are kept cool by air which is forced through the ventilating ducts by fans mounted on the rotor shafts.

The Motors

The four motors are of the Westinghouse induction type. They are directly-connected to the propellers, and each can develop a maximum of 8,375 horsepower continuously. To provide a sufficiently wide speed range, each has two windings, one of 24 poles and the other of 36 poles. The same result could have been obtained by the use of a single winding, but this would have involved greater complication in the connections and would have restricted the design in other ways. The 24-pole winding is connected to slip-rings on the rotor shaft, while the 36-pole winding has short-circuiting connections and is equivalent to a squirrel-cage arrangement. Both windings are used for running, but only the 24-pole for starting and reversing, resistance being inserted in series with it during these operations.

The insulation of the motors is similar to that of the generators, and ventilation is provided by means of two motor-driven fans mounted on the top of each motor.

Speed Control

The method of controlling the speed of the motors can be readily understood by considering that the 36-pole winding is equivalent to a gear of an 18 to 1 ratio between the turbines and the propeller, while the 24-pile winding is equivalent to a gear of 12 to 1 ratio. Hence when the 36-pole winding is used, the motor speed will vary from 83 to 126 revolutions per minute when the turbine speed is varied through its range of 1,500 to 2,270 revolutions per minute, and with the 24-pole winding, the motor speed range is from 126 to 186 revolutions per minute.

To control the speed of the ship, three different combinations are employed:

1. From 9 to 15 knots, the motors are operated on the 36-pole windings and all four are driven by one turbo-generator.
2. From 15 to 17 knots, the motors are operated on the 24-pole windings by means of one turbo-generator.
3. From 17 to 21 knots, the motors are operated on the 24-pole windings by means of both turbo-generators.

To reverse, two phases at each motor are transposed without changing the direction of rotation of the turbo-generators.

Steam Consumption

The use of one turbo-generator for the lower speeds assists in maintaining good operating economy by keeping the load on the generating unit close to its rated capacity except at the very slowest speeds. The steam consumption per shaft horsepower-hour, including that required for excitation, condenser operation, and motor ventilation, is as follows:

Speed in Knots	Motor-Poles	No. Turbo Units	Pounds of Steam.
9	36	1	16
15	36	1	12
15	24	1	13
17	24	1	12
17	24	2	12.4
19½	24	2	11.7
21	24	2	11.9

Control System

All the switching apparatus for controlling and distributing the power to the motors, for regulating the main turbines, and for controlling the excitation of the gen-

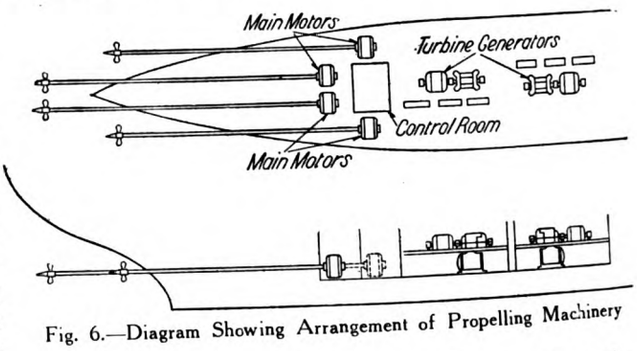


Fig. 6.—Diagram Showing Arrangement of Propelling Machinery

erators, is located in a central control room, where the operator has directly in front of him everything necessary for the operation of the equipment. Full advantage has been taken of the great facility with which electric current can be measured, inasmuch as the data thus obtained greatly assist in the operation of the ship.

The rheostats used for starting and reversing the propeller motors are of the automatic liquid type, in which the resistance is varied by adjusting, by means of a pump, the level of a liquid in which fixed electrodes are immersed. This type of rheostat, though not as yet extensively used by the Navy, has become very popular in industrial service because of its simplicity, compactness, and reliability.

The cables connecting the generators and motors are

Generated on 2024-09-12 08:02 GMT / https://hdl.handle.net/2027/uiug.30112004006158
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

of great importance because the operation of the ship depends upon their reliability. In order to insure the best possible type of construction, a committee of the American Institute of Electrical Engineers assisted the Navy Department in preparing the specifications for these cables. They are of the three-core type, and laid in a number of parallel circuits, so that the failure of any single cable will not seriously interfere with the operation of the ship.

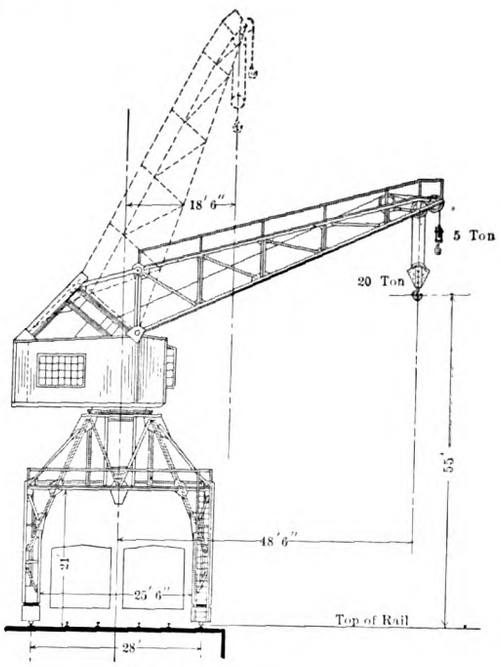
AUXILIARIES

The main circulating pumps are of the centrifugal type and are operated by 235-horsepower motors. Their speed can be varied to suit conditions so that the power consumption can be reduced with the speed of the ship. LeBlanc air ejectors, which are novel in this class of ship, maintain a high vacuum in the condensers. The condensate is handled by motor-driven vertical centrifugal pumps. Thus, all the main engine room auxiliaries are rotary and are motor-driven, which, it is believed, will insure a higher degree of reliability than the use of some of the older forms of equipment.

Erie Railroad Pier Equipped with Revolving Jib Gantry Cranes

IN order to speed up the handling of freight on Pier *H* of the Erie Railroad at Weehawken, N. J., three revolving jib gantry cranes, of ten tons normal capacity, and one of twenty tons, have been installed by Heyl & Patterson, Inc., Pittsburgh, Pa. Originally Pier *H* was equipped with locomotive cranes, but these proved inefficient, so the pier was rebuilt to an open form, 1,000 feet long and 80 feet wide, with room for five parallel, standard gage, railroad tracks, and the four cranes. Two cranes span two sets of tracks on either side of the pier, so that one track is left free in the center. No obstruction to freight cars is caused by the cranes spanning the other tracks, however, and with this arrangement any of the cranes may reach all the tracks.

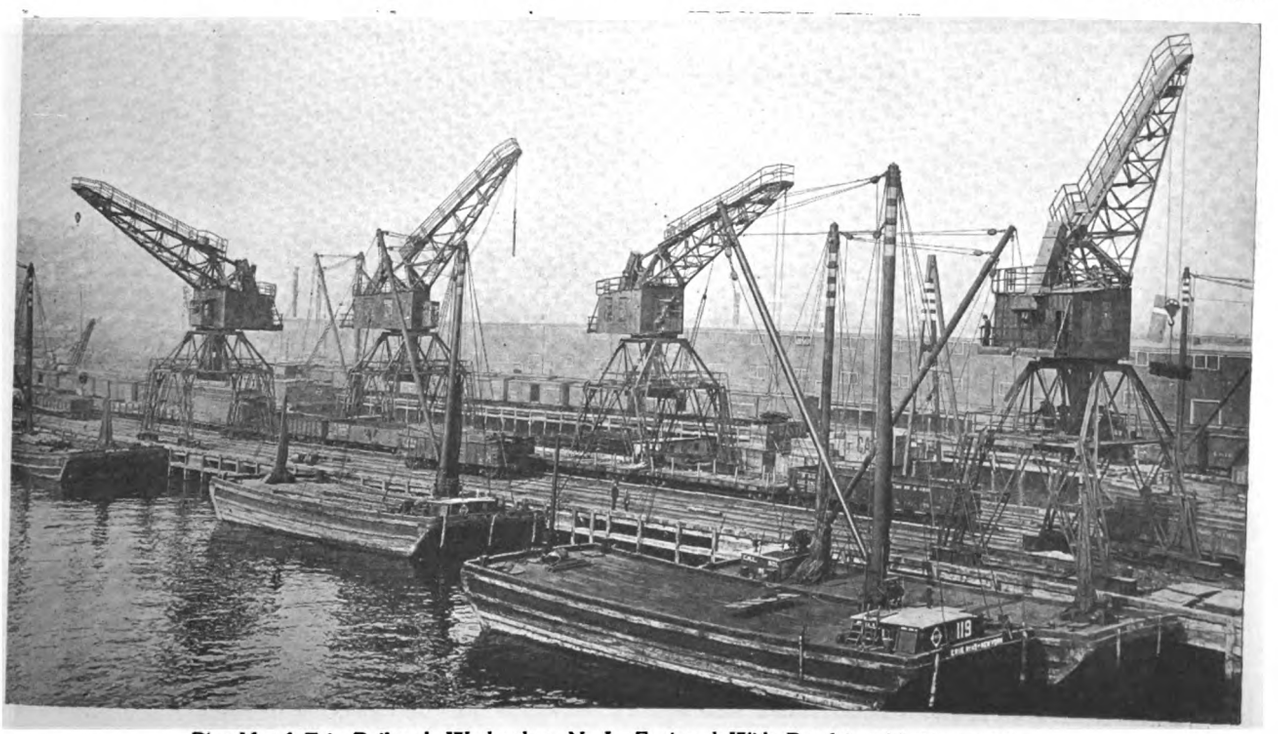
Each crane is equipped with three motors; one of 81 horsepower for the main hoist, one of 33 horsepower for rotating the boom, and one of 25 horsepower for the gantry travel. The current supplied is two-phase, 60-cycle alternating, at 2,300 volts, which is changed for use to a current having characteristics of six-phase, 188 volts



Details of Gantry Crane

potential, and this in turn is converted into a direct current of 250 volts, delivered to the contact rails on the pier. Current is collected from an under-running shoe on the contact rail.

The ten-ton crane has the following speeds: Main hoist, 220 feet per minute; slewing speed, 3 complete revolutions a minute; traveling speed, 150 feet per minute. The speeds of the twenty-ton crane are: Main hoist, 55 feet per



Pier H, of Erie Railroad, Weehawken, N. J., Equipped With Revolving Jib Gantry Cranes

Generated on 2024-09-12 08:03 GMT / https://hdl.handle.net/2027/uiug.30112004006158
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

minute; slewing motion, 2 complete revolutions per minute; traveling speed, 150 feet per minute. The hook lift distance in all cases is ninety feet.

The cranes are equipped with automatic magnetic brakes on the armature shaft of the motor, which hold the load whenever the power circuit is opened. In addition, a standard brake and friction clutch is provided in the drive to disconnect the hoisting drum and hold it stationary while raising or lowering the boom. A solenoid sets the clutch and releases the brake. Magnetic contactor type controllers give either power or dynamic braking, whichever may be necessary for lowering the empty hook, without any shift of the controller handle. Limit switches automatically prevent overhoist of the load.

Concrete Coal and Oil Barges for the Navy

Details of Construction and Launching of 500-Ton Barges Built by the Ambursen Construction Company, Inc.

THE Bureau of Supplies and Accounts, Navy Department, took bids on March 29, 1918, for twelve concrete barges to carry coal on deck or fuel oil in the hold. There were no plans and only very general specifications, each bidder making his own design to submit with his bid.

The contract for four vessels was awarded to the Ambursen Construction Company, Inc., of New York City, their design having been selected by the Bureau of Construction and Repair of the Navy Department as being the most satisfactory. Two of these barges have now been completed and delivered.

Main Particulars

The illustrations show the general appearance of the completed vessels, one of them being treated with waterproof paint and the other being left as it came from the forms.

The general dimensions are as follows:

Length on deck	112 feet
Length on bottom	83 feet
Width	36 feet
Depth in center	12 feet 3 inches
Depth at ends	13 feet 3 inches

The Navy Department describes these boats as "500-ton coal and oil barges." However, as they are designed to have an average freeboard of 3 feet 6 inches under this load, they will actually carry about 750 tons.

Three longitudinal and five transverse bulkheads divide the barge into compartments.

Bulkheads

All of the bulkheads are designed to withstand full hydrostatic head on either side. Eight large compartments along the centerline are to hold the cargo of oil, while others are for buoyancy only. For the alternative cargo of coal, flashboards are provided on deck five feet in height.

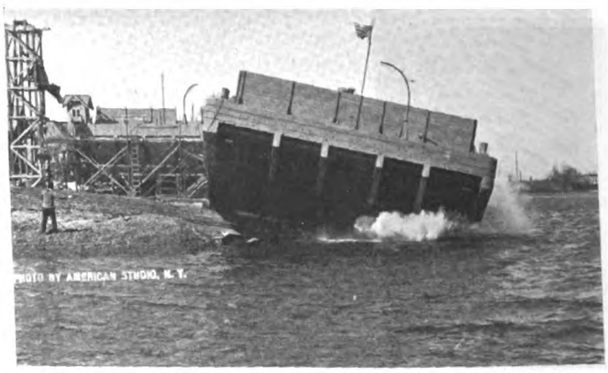


Fig. 2.—Launching of First Barge

Fig. 1.—General View of Ambursen Yard With Two Barges Nearing Completion on the Ways

Generated on 2024-09-12 08:06 GMT / https://hdl.handle.net/2027/uiug.30112004006158
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Fig. 3.—Launching Ways

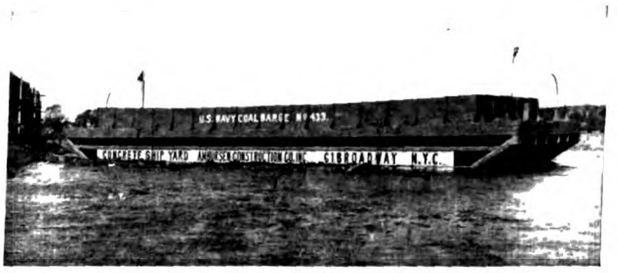


Fig. 4.—Barge No. 433 Afloat

The general design is a 3-inch reinforced concrete slab on frames 16 inches deep, spaced 3-foot centers. This layout holds good for deck, sides and bottom. The bulkheads are also 3 inches in thickness and are stiffened with ribs 3 feet on centers on both sides. Gussets at all intersections provide ample stiffness.

Fig. 1 shows the general layout of the Ambursen yard with the two boats nearing completion on the ways. The concrete plant was located centrally between the two boats and concrete was delivered over a scaffold in wheelbarrows. Forms were made up at a carpenter shop about fifty feet back of the mixing plant with gasoline (petrol) driven woodworking tools.

Fig. 1 also shows barge No. 433 as she appeared when ready for launching. Fig. 4 shows this boat in the water immediately after her successful launching. Fig. 2 shows the same boat just as she went over the end of the ways at the launching.

The side method of launching was adopted and proved entirely successful. Fig. 3 shows how the launching blocking was arranged. The forward half of the boat was carried on slippers run longitudinally, as is customary in side launching, but under the rear, shoes were provided paralleling the groundways and with guides bolted on the sides to insure that the boat would be properly supported until she had cleared the ways.

Naval Construction During the War*

Light Cruisers of Arethusa Class and Subsequent Designs—Heavier Cruisers of 1915 Programme—River and Seagoing Monitors

BY SIR EUSTACE TENNYSON D'EYNCOURT, K.C.B.

FOLLOWING upon the previous light cruisers of the Town classes, the particulars of which have already been published, a very important departure was made in the light-cruiser design in the programme 1912-13, when the *Arethusa* class was designed by Sir Philip Watts. The importance attached to speed was specially brought out in this design, and it was decided to install very powerful machinery with a shaft horsepower of 40,000, and this could only be achieved by adopting a type of engines and boilers closely approximating to those hitherto used for destroyer classes.

In conjunction with high speed a good armament was provided, consisting of two 6-inch and six 4-inch guns, though in the original design the armament consisted entirely of 4-inch. The ship's sides up to the level of the upper deck were protected by specially high tensile plating varying from 2 inches to 1½ inches and 1 inch, throughout the machinery spaces, in addition to the 1-inch shell plating. This arrangement of plating also greatly added to the strength and stiffness of the ship regarded as a girder. Further particulars of the class are given in the table (see page 391, June issue).

The *Arethusa* and other light cruisers were in the action off Heligoland on August 28, 1914, and gave an excellent account of themselves.

In the 1913-14 programme the *Calliope* class, slightly larger vessels than the *Arethusas* but with the same power, were decided upon. After considerable discussion regarding the merits of mixed or homogeneous armament, it was decided to give these vessels two 6-inch guns, both on the centerline placed aft, and eight 4-inch guns. The protection consisted, as in the previous design, in a 2-inch belt over the shell plating, making a total thickness of approximately 3 inches. Most of this class had practically the same machinery as the *Arethusas*, but Parsons geared turbines were installed in two of them, the *Calliope* having four shafts and the *Champion* having only two shafts. This was at the time a very important experiment, the putting of 20,000 horsepower through gearing being a very bold departure from anything which had been hitherto contemplated. The final results obtained with *Champion* were, however, excellent, and she obtained a speed of 29½ knots with 337 revolutions and about 41,000 shaft horsepower, this speed being slightly in excess of any of the other vessels of the class at corresponding displacement.

For the subsequent classes I would refer to the tables, which show a gradual growth in size and power of armament; *Ceres* class finally having a length of 425 feet and a beam of 43 feet 6 inches, and a normal displacement of about 4,200 tons. These vessels carried five 6-inch guns, all on the centerline.

The next class were the *"D's,"* the general arrangement and protection of which followed that of the *Ceres*, except that 6-inch guns were carried on the centerline instead of five. The power was only slightly increased in these ships over the previous classes, but the revolutions were reduced to 275, all of these later classes having the twin-screw geared arrangement, and although the displacement of the *"D's"* increased to 4,650 tons, the additional length

*From a paper read before the Institution of Naval Architects, London, April 9. **Continued from June issue.**

Generated on 2024-09-12 07:49 GMT / https://hdl.handle.net/2027/uiug.30112004006158
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

and the reduction of revolutions enabled a speed of close upon 30 knots for the whole class of light cruisers, *"C's"* and *"D's,"* to be practically maintained.

The *Arethusas* and the *"C"* and *"D"* classes all had oil fuel only.

In addition to these light cruisers, which were all to Admiralty design, two vessels—the *Birkenhead* and *Chester*—which were built at Messrs. Cammell, Laird's for the Greek Government, were purchased in 1915. These vessels were considerably heavier than the *"C"* class and more closely resembled the British *Chatham* class. They carried an armament of ten 5½-inch guns. The machinery was modified to burn oil only, in the *Chester*, instead of coal and oil as in the *Birkenhead*, and the resulting increase in power to 31,000 gave the former a speed of 26½ knots.

The "Raleigh" Class

In the summer of 1915 designs were prepared for a considerably heavier class of light cruisers, more especially designed for ocean work in any part of the world. They were to have a speed of 30 knots and a large radius of action. Various armaments were considered, and it was finally decided to adopt an armanent of seven 7.5-inch guns with twelve 3-inch (four being on high-angle mountings). Five of the big guns were placed on the centerline, and the other two were on the broadsides amidships. The bow and stern guns were superposed, thus giving a fire of four guns, both ahead and astern, and six guns on either broadside. The conditions laid down involved a ship of great length, and these vessels consequently have an overall length of 605 feet. These ships were originally designed to burn oil and coal, but this was subsequently altered in three ships of the class to all oil, the original power of 60,000 shaft horsepower on a four-shaft geared turbine being considerably increased up to about 70,000 shaft horsepower by the change to all-oil firing.

These vessels also differed from the light cruisers referred to above in having modified bulges as protection against underwater attack. The form of the section shows how these were arranged. The protective plating was similar to that of the other light cruisers.

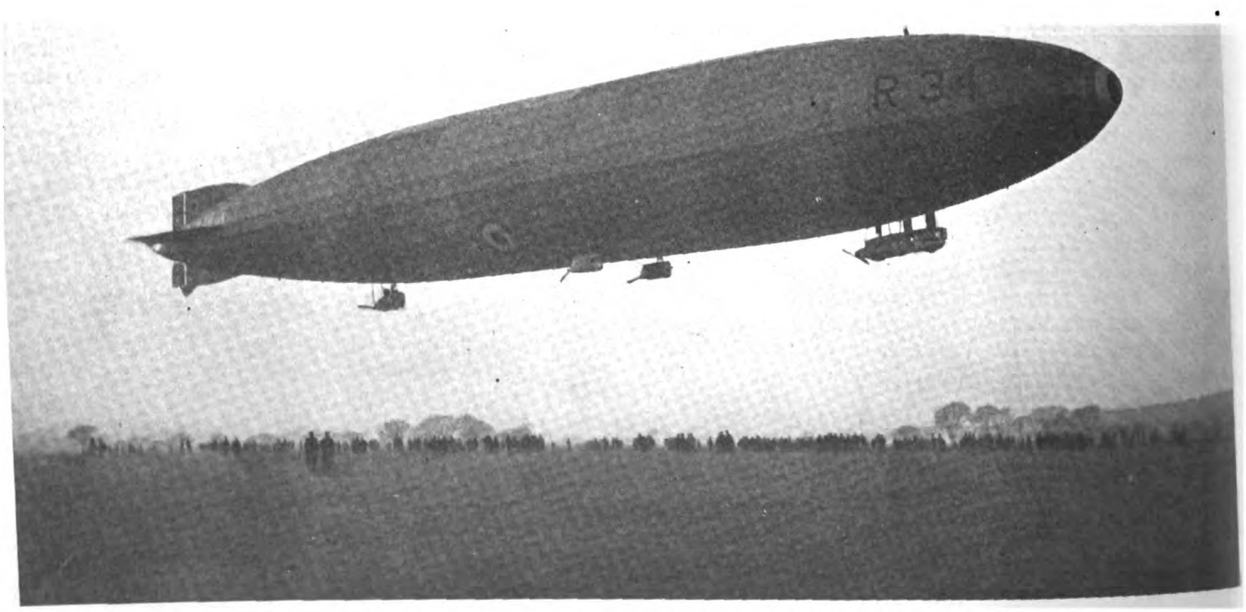
Monitors

The first vessels of this type to be added (or reintroduced) to the British Navy were three three ex-Brazilian river monitors built by Messrs. Vickers, Ltd., and taken over by the British Government in August, 1914, and renamed *Humber, Mersey* and *Severn*. The particulars of these vessels are given in the table, from which it will be seen that the armament consisted of medium caliber guns, viz., 6-inch and 4.7-inch. These vessels, though lightly built, have done very good service in the war, both on the East African and Belgian coasts.

The need for vessels of the monitor type mounting heavy guns soon became apparent, and I received instructions in November, 1914, to prepare designs of monitors of more substantial structure for sea-going service, but of light draft with good protection and carrying some heavy guns, the light draft combining the advantages of being able to go close inshore and greatly reduce risk of being struck by a torpedo.

The earliest design was that of the 14-inch gun monitors, four in number, which was commenced in 1914. Four twin-mounted 14-inch guns and mountings were available, and with the very simple form of structure adopted these vessels were designed and built in six months. They were quickly followed by the 12-inch monitors, which were of similar design but carried pairs of 12-inch guns, generally taken from older battleships. These vessels were also built in about six months. They all had a complete bulge of a form which was of simple construction.

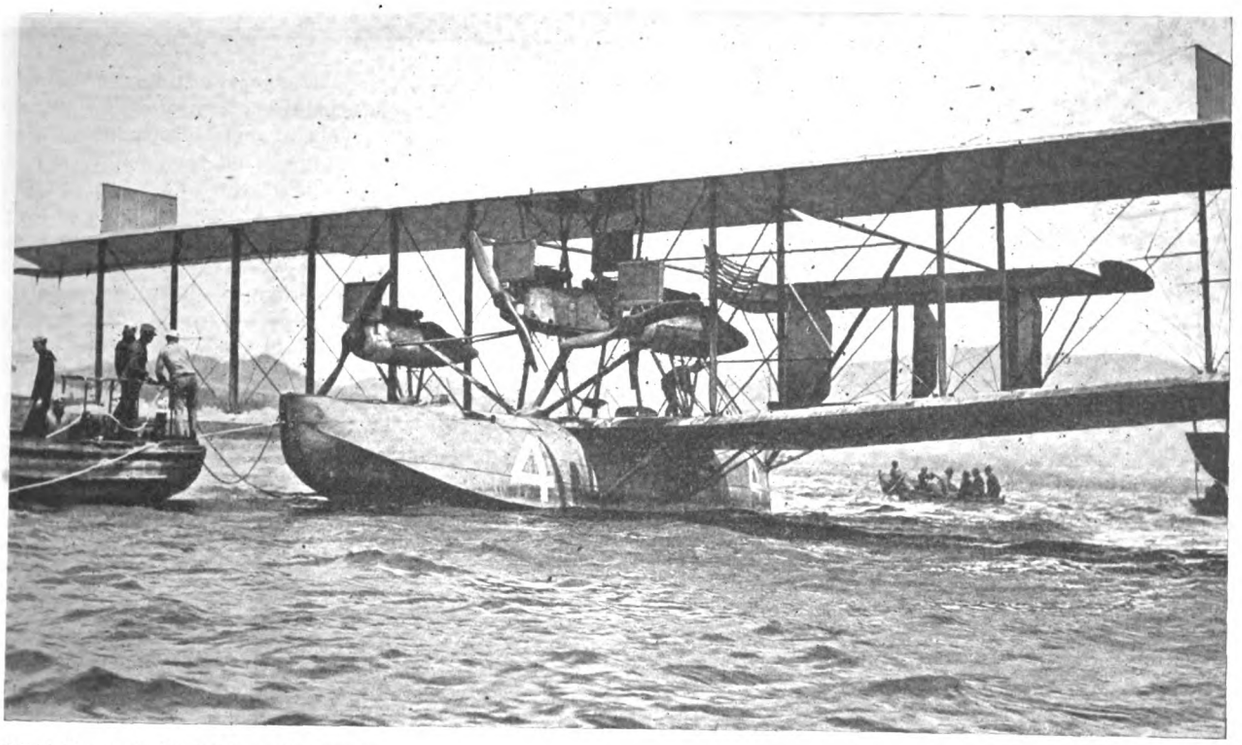
(*To be continued.*)



British Dirigible *R*-34, Built at the Beardmore Airship Works, Inchinnan, Renfrewshire, Scotland, for the Admiralty. This Giant Airship, which is About 650 Feet Long by 80 Feet Diameter, with a Lifting Capacity of Over 30 Tons, is Fitted With Sunbeam Engines Capable of Driving the Craft at a Speed of 70 Miles Per Hour. A Transatlantic Flight is Contemplated Early This Month

Generated on 2024-09-12 08:33 GMT / https://hdl.handle.net/2027/uiug.30112004006158
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

United States Naval Aviators the First to Fly Across the Atlantic Ocean



(Official Photograph, U. S. Naval Air Service.)

United States Naval Seaplane *N. C. 4*, the first Airship to Cross the Atlantic

(Official Photograph, U. S. Naval Air Service.)

The *N. C. 4* at Ponta Delgato, En Route from New York to Plymouth, England

Generated on 2024-09-12 07:49 GMT / https://hdl.handle.net/2027/uiug.30112004006158
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

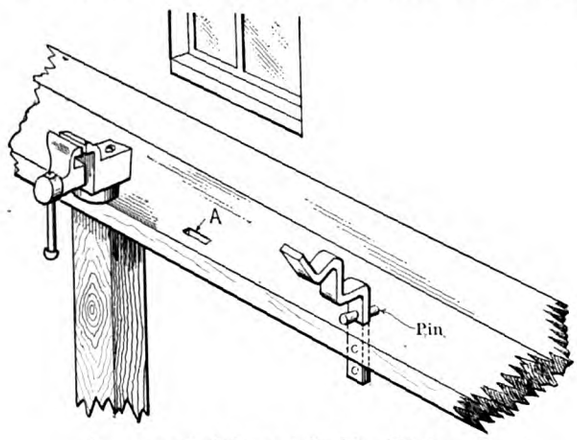
Letters from Marine Engineers

Discussion of the Design and Handling of Marine Engines, Boilers and Auxiliaries—Breakdowns at Sea and Repairs

This department is open to all readers of the magazine for the discussion of affairs in the engine room. All letters published are paid for at regular rates. Your ideas or experiences will be mutually helpful and interesting to other engineers. Write your letter now.

Vise Work Support for Bench

The drawing shows a very handy easy-to-make type of long work support to use on the edge of the work bench at any desired distance from the bench vise. The support is made from 5/8 by 2-inch flat bar stock, being simply



Arrangement of Support for Vise Work on Bench

heated and bent to the shape shown and several holes drilled in the leg to take the upright adjusting pin. Slots are cut as at *A* along the outside of the bench at about 2 feet apart, thus allowing the support to be quickly changed to suit the work. W.

Leaky Valves

It sometimes happens that a valve after it has been installed (especially a large valve in an installation subject to high pressures and large ranges of temperature), no matter how carefully overhauled and ground to perfect fitness on the valve seat, still continues to leak.

When the valve is constructed and ground the metal is not in the normal condition of use; that is, it is not in the condition of temperature and strain due to contact with hot or very cold fluids, or pressure of the valve disk against the seat. The fit being made when the metal is cold, the valve and valve seat will become distorted as soon as the temperature of the metal rises, and the distortion, if equal all around, will be uniform and the fit preserved, but if unequal no amount of grinding will remedy it.

The tongue of metal on which the valve seat is cut is subject to the most distortion, due to the fact that its shape admits of expansion, which is mostly in a linear direction, and where there is considerable difference in the lengths of the tongue around the valve body the valve seat will bcome hilly or out of round. Such troubles are very common in high pressure compressor valves of large diameter with V-shaped seats. The temperatures in compressors take a wide range and come very high, so that if inequalities occur in the amounts of metal projecting from the valve body, the distortion will be very marked and extremely troublesome in high pressure work. Large capacity compressors working at high pressures can be found in numerous cases with valves of such faulty construction, and, possibly, design.

The writer has had experience with a valve on a steam steering engine closing against the pressure that somehow or other could never be made tight. Apparently nothing was wrong with the valve, but upon analysis of the trouble it was found that, due to inaccessibility of one side of the valve, it was left uncovered by lagging on one side, which subjected it to considerable cooling. It was suggested that this caused unequal distortion; but this idea was laughed at as being improbable, no appreciable distortion taking place. However, the argument prevailed, and the valve was completely lagged on the outside, which remedied the trouble like magic.

Air compressor valves with seats constructed in the cooling jacket with unequal distribution of metal will have their seats distorted in this manner. In one case of a 10-inch boiler stop valve the distribution of metal was so unequal that reseating and grinding was of no avail, that being repeated many times. Finally steam coils were made to wind around the valve body and the valve was heated to approximately a working temperature, then reseated and ground while the metal was in the heated condition. This took out the hills and oblique condition of the valve seat, and even when the valve was cold there was apparently enough spring in the disk to shape itself to the valve seat, which obviously must have contracted to an oblique shape upon cooling.

The effect of mechanical strains, such as the pressure of the valve disk on the seat, as a rule is taken care of in the design; but even then a valve may sometimes be found with weak or very springy metal, so that when the valve disk sets heavily on the seat it will spring it away from the ground fit. A good remedy for such a condition is to round off the top edge of the valve seat, because, when a valve is ground it usually leaves a shoulder on the valve disk that will catch on the sharp edge of the seat and not allow the disk to go down into the taper, and, should there be any spring in the valve seat, a tight fit can still be maintained by the approximate ball joint.

A grave source of trouble with spring loaded valves is in springs that do not stand up vertically, thus settling the disk down unevenly, causing an uneven wear on the valve in intermittent working, such as pump valves. Relief valves are subject to such troubles and, in addition, in this kind of valve, and particularly where steel valve stems are used, the valve will blow at different pressures other than that at which it was set. This is generally caused by corrosive material being scraped into the socket of the valve in which the valve stem rests every time the valve lifts, thereby changing the tension on the spring by the grit coming from under or getting under the valve stem.

Usually very little attention is paid to this part of the

Generated on 2024-09-12 08:01 GMT / https://hdl.handle.net/2027/uiug.30112004006158
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

valve in boiler safety valves, so much so, that in some cases the valve and stem are frozen solid, the man overhauling the valve thinking that it was meant to be so. The pressure of the spring being several tons was enough to dislocate the valve stem from its apparently fixed position in the valve socket every time the valve lifted, thus putting a new tension on the spring.

New London, Conn. W. H. SPRINGER.

Testing Watertube Boilers

The writer has recently had under his charge the testing of some eighty or ninety new watertube boilers, and the preparing of same for steaming conditions. As the method adopted has been very successful, and may also be applied to some other classes of watertube boilers, these notes may be of interest.

First, a general idea of the boilers under consideration will be given, and then the three following items discussed:

1. Character of test required.
2. Preparing for and carrying out test.
3. Preparing for steam.

The boilers referred to above were of the Yarrow type: Steam drum, 50 inches diameter by 12 feet long; water drums, 30 inches by 12 feet long; number of tubes, about 3,500 of 1-inch diameter, except the three inner rows on each side, which are 1¼ inches in diameter; average length, about 8 feet.

The steam drum carries four safety valves bolted to pads and riveted on the shells. The front head carries the main stop valve, surface blow, two water gages, three try cocks and the auxiliary feed valve. The internal auxiliary feed pipe, scum pipe and steam-dryer pipe are fitted in the drum. The manhole is 16 inches by 12 inches.

The water drums (front heads) carry the main feed valves, and one drum is fitted with a salinometer cock. Each drum has an internal feed pipe arranged in a casing so as to cause a forced circulation. Blow-down valves are fitted to the shell of each drum. The manholes are 16 inches by 12 inches. Each boiler was capable of giving 7,000 horsepower, burning oil in a closed fire-room.

CHARACTER OF TEST REQUIRED

The character of the test required is as follows: Drums and tubes are to be tested to 400 pounds cold water pressure for one hour. The boiler, complete with all mountings, to be tested on board to 330 pounds cold water pressure for a period of six hours, a loss of eight pounds being the limit allowed in this time.

It will be readily admitted that such a test is severe and calls for careful preparation.

PREPARING FOR AND CARRYING OUT TEST

As they come from the shop the boilers are usually in a very dirty condition; oil and grease from the tube expanders, chips of metal, scale, rivet heads, etc., are sure to be found in plenty. The oil need not trouble us at this stage, but all particles of metal, or anything liable to damage the valves, must be thoroughly blown out with an air hose; also each individual tube should be blown in order to ensure that it is clear. The boiler valves, though new, should all be taken apart, cleaned, and given a rub with finest emery to ensure a perfect seat. It is impossible to lay too much stress on the fact that this work must be faultless; a drop, however slight, is enough to spoil a perfect test.

After all the valves have been attended to, the safety valves may be gagged, the manhole doors carefully put on, air cock opened and the boiler filled slowly. For obtaining the best results all the air should be driven out, and this is sometimes a difficult matter. The air cock is usually fitted to the top of the drum, but a certain amount of air is trapped in the safety valves and in the main stop if this rises much above the level of the top of the drum. However, the amount trapped is small, and it is preferable to allow it to remain rather than to open the valve, as there is sure to be some little particle of grit in the water that may lodge on the seat and necessitate regrinding.

Having the boiler full, we may proceed to pump up by the hand pump to about 100 pounds. At this pressure it is well to make a thorough examination of the boiler, looking to all seams, rivets, mountings and tubes. Any leaky tubes can be easily detected by a long lighted taper passed between the rows. Assuming all is well, the pressure may be increased to 200 pounds, and later to 250 pounds, a good examination being made at each pressure. The manhole doors will probably require a little tightening up by this time.

If any fittings should be found porous they must be dealt with as experience dictates. A very small leak may be stopped by peening with a hammer or by a calking tool, care being taken to relieve the pressure first. If a casting is spongy it should be removed and a new one fitted in place. Valves not exposed to steam, as, for instance, the main feeds, may be tinned, if necessary.

Let us now assume that all is satisfactory and that the pressure on the boiler has been raised to 330 pounds without any leaks. We can relieve the pressure and prepare the boiler room for the final test.

All gages to be used should be calibrated and large gages should be used, so that a drop of even half a pound may be noted. Boiler room hatches should be closed or covered with canvas, and all openings in bulkheads plugged up, in order that the boiler may not be subjected to any draft. Stacks must also be covered, and all openings to the furnaces closed.

When this is done, and the necessary thermometers, etc., are in place, the inspector may be called, the boilers pumped up to the full pressure, and the hand pump locked or disconnected.

Readings should be taken every half hour. If it is desired to gage any part of the boiler while under test, suitable arrangements must be made beforehand.

The writer took some measurements of the boilers both before the pressure was applied, and while it was on, with the following results: After a 400-pound test on the shell and tubes (all openings for fittings being blanked) the part faced for the main stop showed a permanent distortion of thirty-seven thousandths, and the faces for water gage fittings as much as twenty-five thousandths. All these faces had to be scraped up again before fitting the mountings. Before applying the 330-pound test with mountings in place, measurements were taken between port and the starboard water gage fittings (top) and found to be 24 inches. While the pressure was on, this showed 24¼ inches. The fittings were bolted to extensions on the head about 8 inches long. A tram was also made from the boiler shell to the top of the main stop spindle, and under this pressure showed a difference of ⅛ inch. The head was ¾-inch thick.

PREPARING FOR STEAM

After the test has been passed, we may proceed to clean the boilers, as follows: Having emptied them and removed the bottom manhole doors, we put into each bottom drum 25 pounds of soda, 6 pounds of lye and 5 gallons of coal oil. Replace the manholes and put in enough water to fill

Generated on 2024-09-12 07:51 GMT / https://hdl.handle.net/2027/uiug.30112004006158
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

the bottom drums. Then connect a temporary steam pipe to the bottom blows and admit steam carefully at about 40 pounds pressure. The steam will condense, and, in time, bring the water to the boiling point.

When the pressure on the boiler is approaching that of the incoming steam, the surface blow may be slightly opened to maintain a pressure of 25 or 30 pounds. The condensation of steam will soon fill the boiler to the level of the scum pan, and all oil and grease will be removed in this manner.

Boiling is continued about 70 hours. At the end of this time, the boilers may be emptied and allowed to cool and then the manual part of the cleaning will commence. The tools required are few and simple: Wire hand brushes, tube brushes, wire cables fitted with sockets into which the tube brushes are screwed, scrapers, and a bale of rags, are all that we require.

First the internal pipes are removed and the top drum brushed down thoroughly with the wire brushes, care being taken to clean well around the tube ends. Sometimes there is a little mill scale found on the heads, especially around the flange, and this can be removed with scrapers. It is not well to try to chip it, as the head must be left as smooth as possible.

When this is finished, the tubes may be started. The wire brushes should be wrapped with rags, as this leaves the tubes in a fine polished condition, whereas a wire brush alone makes them look streaky. The brushes will only clean the parallel part of the tubes, and the bell-mouth must be "poked" by means of a stick wrapped with rags.

After this is done, the drum and tubes may be blown out with the air hose, and then the bottom ends of the tubes "poked" in a similar manner and the bottom drums wire-brushed, and, if necessary, washed with coal oil.

As soon as the bottom drums are finished and attention has been given to all the small outlets for water gage fittings, etc., which are easily choked up, the boiler may be inspected by the chief engineer of the ship, who should, in the case of straight-tube boilers, "sight" every tube from the top drum, while his assistant holds a light at the bottom. If the inspection is satisfactory, the internal pipes may be cleaned and replaced, and the boiler filled to the working level with distilled water.

Should the boilers not be required for any considerable time, it is better to fill them right up to the air cock with slightly alkaline water, or they may be left dry and a tray of burning charcoal introduced into each bottom drum and the boiler closed entirely.

San Francisco, Cal. A. BLUNDUN.

Two Handy Kinks

In the course of time there accumulates around the shop a lot of solder scraps, short ends of bars, and drops of solder that run off the work, etc. These should be saved up in a box and when a sufficient quantity accumulates melted and re-cast into bars.

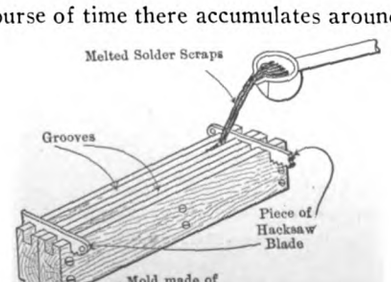


Fig. 1.—Mold for Casting Bars of Solder

Very satisfactory molds for the purpose can be made by obtaining a couple of pieces of tongued and grooved boards. Nail them together, as shown in Fig. 1, and use a couple of old hack saw blades for dams at the ends; just saw the blades in crosswise and leave them there.

A useful, cheap and easily made cotter key extractor can be made from an old file, as shown in the sketch,

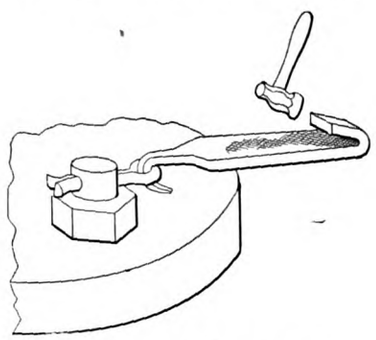


Fig. 2.—Cotter Key Extractor

Fig. 2. The tang is bent hook shape and the other end of the file is heated and bent back on itself, about as shown. For using the tool, hook the tang in the eye of the cotter key and strike blows of the hand hammer on the bent-up end of the file. C. H. WILLEY.

NEW BOOKS

RULES AND INSTRUCTIONS FOR THE INSPECTION OF MARINE MACHINERY. Size, 4 inches by 7 inches. Pages, 143. Philadelphia, 1918: United States Shipping Board Emergency Fleet Corporation. Price, $1.

A handbook giving general instruction for the inspection of reciprocating steam engines, Diesel type engines, turbines, reduction gears, watertube and Scotch boilers, pumps, condensers, refrigerating machinery, propellers and auxiliaries.

PRACTICAL SHIP PRODUCTION. By Lieutenant-Commander A. W. Carmichael, U. S. N. Size, 6 by 9 inches. Pages, 252. Illustrations, 101. New York, 1919: McGraw-Hill Book Company. Price, $2.50.

Designed as an aid for beginners in shipyards, this book describes briefly the various parts of a vessel, the problems involved in the design of a ship, the features and equipment of a shipyard, and finally the various operations of building a ship. No attempt is made to go into the theoretical questions of ship design or construction, but rather to give a practical manual for shipyard workers and officials.

THE NAVAL ARCHITECTS, SHIPBUILDERS AND MARINE ENGINEERS POCKET-BOOK. By Clement Mackrow and Lloyd Woollard. Twelfth edition. Size, 4 by 6½ inches. Pages, 760. Illustrations, 268. New York, 1918: The Norman W. Henley Publishing Company. Price, $6.

Mackrow's handbook was materially enlarged and the data brought up to date in the last edition, which was published in 1916. In the new edition the opportunity has been taken to correct a few errors that had arisen in the previous editions and to add in the form of an appendix supplementary notes referring to various sections of the book. Of chief interest in the new material is an article on estimating the weight and cost of a merchant vessel, contributed by Mr. Colin Bartlett, of the staff of the chief ship surveyor of Lloyd's Register. This will be found of particular value in small shipyards where a definite system of estimating costs is not yet in operation.

Generated on 2024-09-12 09:01 GMT / https://hdl.handle.net/2027/uiug.30112004006158
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Questions and Answers for Marine Engineers

Inquiries of General Interest Regarding Marine Engineering and Shipbuilding Will Be Answered in this Department

This department is maintained for the service of practical marine engineers, draftsmen and shipbuilders. All inquiries should bear the name and address of the writer. Anonymous communications will not be considered. The identity of the writer, however, will not be disclosed unless the editor is given permission to do so.

Boiler Spares

Q. (1008).—Acting as second engineer, I am told to prepare a vessel having Scotch boilers for a long voyage. What spares would it be advisable for me to carry for such a trip?

A. (1008).—If the boiler is old, it would be advisable to have half a dozen boiler tubes, one dozen zincs, half a dozen manhole and handhole gaskets, a spare check valve, one-half dozen gage glasses with washers, a spare safety valve spring, stem and disk, one set of grate and wing bars, baffle plates and fire bucket. The above spares are for one boiler only.

Bilge Suction Lines

Q. (1011).—We have had trouble aboard my ship with getting bilge suction lines clear. Our coal cargo seems to sift through and get into wells where it clogs the strainer and prevents the pump from working. At times the water will accumulate in the hold due to raining in with the hatch covers off, and it is very difficult to get at the strainer. Can you suggest any remedy? ASSISTANT.

A. (1011).—I suppose you have tried flooding back. If this is done, make sure that all non-return valves are removed. In one case, to my knowledge, there were three non-return valves which had to be removed before it was possible to flood back. Usually there is a strainer in the manifold which should be cleared, as it will be found full of fine coal. The best remedy, of course, is to keep the bilge wells clean, which should be done regularly by the deck force and inspected by the first assistant.

Attached versus Independent Pumps

Q. (1012).—Kindly inform me concerning the advantages and the disadvantages of attached versus independent pumps, with special reference to the air pump. B. H. S.

A. (1012).—The attached pump has the following advantages, viz., few working parts, no steam cylinder, requires little attention or regulating and is probably cheaper. Being driven by the main engine the efficiency of its drive is undoubtedly higher than in the case of the independent pump.

The point in favor of the independent auxiliary is that its speed can be regulated to correspond with the power exerted by the main engine, and, further, the handling of main engine is easier, as the vacuum is maintained while the engine is at a standstill.

Division of Work in Engine Department

Q. (1013).—I am desirous of obtaining information in regards to the duties of the different engineers aboard ship and the machinery under their special care on single-screw ships, also on ships of two or more screws. I have been told that you could furnish me with this information. If so, I will deeply appreciate your help in this line.

A. (1013).—In single-screw American merchant steamers it is usual to have four engineers; the only exceptions are very small steamers, such as trawlers or certain passenger steamers, where the run is not more than ten or twelve hours. When there are four engineers the chief does not stand watch except in case of an emergency, but he, of course, is held responsible for the work of his department and the making out of logs, repair lists, requisitions, etc. The first assistant has active supervision over all work done in the engine room, his especial care being to supervise the overhauling of the main engine and auxiliaries, in which he is helped by the third assistant. The cleaning and upkeep of the boilers and boiler room are generally left in the hands of the second assistant. A deck engineer whose particular duties are the upkeep of winches, etc., is sometimes carried, but commonly this work is left to the third assistant. For high-powered, twin-screw merchant steamers the work is laid out in much the same manner, although junior engineers are sometimes carried who aid the assistant engineers and usually stand watch in fireroom.

Economical Speed

Q. (1014).—How is the economical speed of a vessel correctly calculated?

A. (1014).—To answer your question fully would require a lengthy reply, which might not even then be complete, for the economical speed may be construed in several different ways, viz.: The maximum distance with the minimum fuel consumption. The speed above which an increase in power does not show a reasonable increase in speed, a matter of prime importance in warship design. In deciding the most economical speed of a merchant ship, several factors enter into the earning power of a vessel, all of which may be covered by the requirement that the net income be the maximum.

A solution of the economic speed problem may be secured in the following manner:

Let V = speed in knots.
D = length of voyage in nautical miles.
C = total cost of operation for voyage, i.e., overhead charge plus propelling cost.
F = overhead charge per hour which may be considered as being made up of wages of crew, depreciation, interest on investment, stores, coal consumption in port, miscellaneous expenses which are incurred when vessel is not running.
C' = net cost of propulsion per hour, and may be assumed to vary as V^3 or $C' = KV^3$.

$$C = KV^3 \frac{D}{V} + \frac{D}{V} F. \qquad (1)$$

To find the minimum value of C, take the derivative of C with respect to V and equate to zero.

$$2KV - \frac{F}{V^2} = 0.$$

$$V^3 = \frac{F}{2K}. \qquad (2)$$

The most economical speed may be obtained by solving equation (2), the value of K being obtained from equation (1), as we must know the value of C' for one speed.

While the above solution seems straightforward, its practical application is by no means easy. Some very interesting articles have recently appeared on this subject. Among these a paper by John Anderson before the Institution of Naval Architects, 1918, also article in MARINE ENGINEERING for 1916 on pages 81 and 316.

Generated on 2024-09-12 07:51 GMT / https://hdl.handle.net/2027/uiug.30112004006158
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Shipbuilding and General Marine News

Contracts for New Ships—Shipyard Improvements—Engineering Projects—Improved Appliances—Personal Items

INTERNATIONAL MERCANTILE MARINE DEAL VOTED DOWN

Stockholders by Seven to One Vote Show Disapproval—Firm to Continue on Old Basis

By an overwhelming vote the stockholders of the International Mercantile Marine Company have turned down the offer of $130,000,000 made by a British syndicate for the fleet and assets of the company's British subsidiaries. The vote on the sale stood 78,521 preferred and common shares for, and 530,072 preferred and common shares against.

After the stockholders' meeting at which this action was taken, P. A. S. Franklin, president of the International Mercantile Marine Company, announced that the company would continue to do a regular shipping business, and that the future development of its American flag fleet would depend upon the United States Government shipping policy.

The killing of the motion to accept the offer of the British syndicate ends a long period of uncertainty regarding the future of this concern. Since November, 1918, negotiations for the disposal of the British subsidiaries of the company have been under way, and it was only after the Shipping Board took its hands off that matters came to a head.

Arthur Kill Marine Terminal

Plans are now being prepared by H. McL. Harding, terminal engineer, New York City, for the development of four terminal units, each 600 feet in frontage and about 1,300 feet in width on the Arthur Kill, Staten Island Sound, N. J. The estimated cost of the facilities and equipment is about $1,200,000.

BRITISH SHIPPING MINISTRY ASKS FOR $427,500,000

Shipbuilding Transfered to Private Concerns

In the light of Chairman Hurley's recommendations to Congress regarding the advisability of ownership and management of the American merchant fleet by private capital, and the request for additional appropriation to carry out the Shipping Board's plans, the following data concerning the problem as handled on the other side are enlightening.

The status of the British shipbuilding programme is indicated by the report submitted by Leslie O. Wilson, Parliamentary Secretary of the Ministry of Shipping, showing that expenditures for Government shipbuilding activities would total about $427,500,000 for 1919. Shipbuilding reports at this time are as follows: Up to May 6, 240 standard ships had been completed with a gross tonnage of slightly over 1,000,000 tons. At the signing of the armistice the Ministry had on service 283 Government ships. The Government was building, or had on order, 595 ships of 3,800,000 tons.

The speed with which the Government has cancelled contracts and disposed of ships is therefore evident. One hundred and fifty-nine ships have been taken over by the builders or cancelled. Under an agreement with Lord Inchcape, 249 contracts were taken over for distribution, without any profit to Lord Inchcape to those British owners who desired them in proportion to their losses. The British, therefore, through these private individuals, have stabilized the shipbuilding industry by underwriting the contracts and so carrying the programme to completion.

A further 68 ships have been sold to British shipowners and 57 to foreign countries. The sale price of these latter vessels amount to £19,600,000. The contract price for these vessels amounted to £16,500,000.

New York Shipbuilding Corporation Has Double Launching

On May 24 the New York Shipbuilding Corporation, Camden, N. J., launched the transport *Wenatchee* and the United States destroyer *Gilmer*. The keel for the latter was laid June 26, 1918, the transport was laid down on June 15, 1918. Both covered and open ways are in use at the yards. The torpedo boat destroyer *Fox*, illustrated on on the opposite page, is also a New York Shipbuilding Corporation product.

Rahway River Terminal

On the north bank of the Rahway River, which empties into Staten Island Sound, it is planned to construct a terminal of about 5,900 feet frontage by 900 feet in depth.

The terminal will be divided into units, eleven of 500 feet frontage and one of 400 feet, the latter being a barge quay for the use of all the units.

H. McL. Harding, terminal engineer, of New York, has been retained to prepare the plans. The estimated cost of the construction is about $2,400,000.

Generated on 2024-09-12 08:04 GMT / https://hdl.handle.net/2027/uiug.30112004006158
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

AMES COMPANY BUILDS 18,000-TON DRYDOCK AT SEATTLE

Six-Pontoon Construction Operated by Electrically-Driven Pumping Apparatus

Construction has been begun on the first two pontoons of an 18-000-ton drydock which the Ames Shipbuilding & Dry Dock Company, Seattle, Wash., is constructing on a site north of its present yards. Work will be begun on the second set of pontoons after the first of July. Each of the pontoons will have a lifting capacity of 3,000 tons. Over 1,000,000 feet of lumber will be used in the construction of each pontoon. These may be utilized in separate units or in any other arrangement desired.

The drydock will have a total length of 540 feet, which will accommodate a ship 650 feet long. The work is being carried out under the supervision of C. J. Carlson, owner of the Carlson yard in Port Blakeley. The pontoons, which will be self-docking, will be fitted with 50-foot towers. Electric-driven pumping apparatus will be installed.

Comprehensive Marine Engineering Course at Lehigh University

The Lehigh University incorporates in its 1919 curriculum a new course covering ship construction and marine transportation. As planned, the work will combine economics and engineering, with a view to training "all around" engineers for this field. Economics, accounting, finance, business law, foreign exchange, industrial management and marine insurance have been included. It is hoped that graduates, after having had experience with shipbuilding companies in designing and building ships, will through this broader college training be able to enter the foreign trade field. An innovation along the newer educational lines has been introduced by a substitution of a class in construction for the usual freshman English, in order to give the students early contact with engineering.

Everett Shipyard Ready for Construction Work

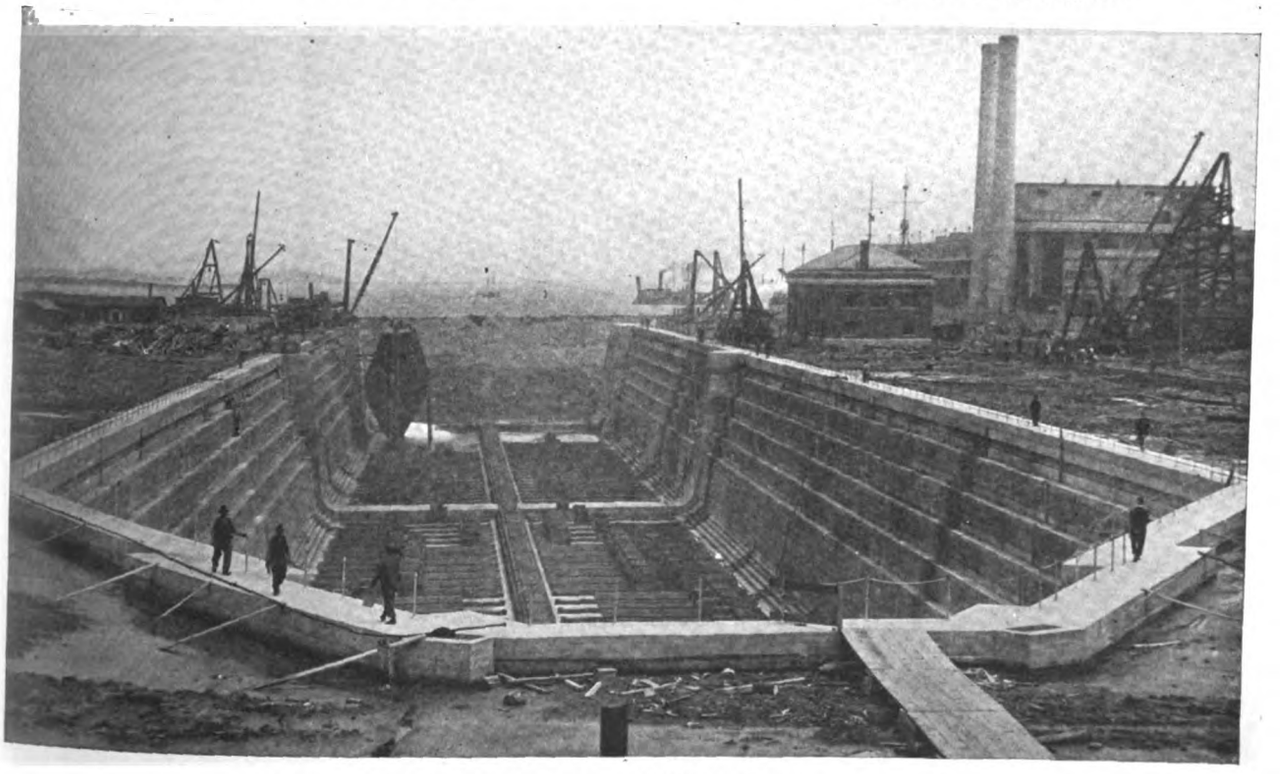
The Everett, Wash., plant of the Norway-Pacific Construction & Dry Dock Company, which holds a contract to build five single screw cutters for the Coast Guard Service is nearing completion.

As originally planned, five shipways, 490 feet in length, to accommodate vessels up to 18,000 deadweight tons, were to be built. Following the signing of the armistice only three ways were constructed. The plant is provided with a fabricating shop, 600 feet long by 101 feet wide, with a mold loft 350 feet by 100 feet. The machinery has already been installed in this building. The boiler house, power house and oxy-acetylene welding plant are also ready for operation, as well as the administration, engineering, employment and hospital buildings, etc. A special storehouse, 150 by 300 feet in size, with a smaller mold loft overhead is also completed.

United States Torpedo Boat Destroyer *Fox*, Built at the New York Shipbuilding Corporation Yards

Field's Point Plant Gains Large Contract

Announcement has been made that large contracts for boilers are about to be placed with the Field's Point plant of the Bethlehem Shipbuilding Corporation. This work will keep the Providence, R. I., plant opened for at least another year. S. W. Wakeman, manager of the Fore River plant, Quincy, Mass., was summoned to Washington to negotiate for the contract.



View of the $3,000,000 Boston Drydock Which is Nearing Completion

Generated on 2024-09-12 07:52 GMT / https://hdl.handle.net/2027/uiug.30112004006158
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Emergency Fleet Corporation Increases Drydock Facilities in the United States

Information concerning the docking facilities in service or contracted for on May 20 was issued by the United States Shipping Board on May 28.

The increase in ship repair facilities as developed under the Emergency Fleet Corporation, may be noted from the tabulation below, which shows complete and incomplete drydocks along all coasts. As may be noted from the figures, a total tonnage capacity of 106,400 tons is provided by twelve marine railways and seven floating drydocks. Two graving docks, 465 feet in length, are not included in the estimate. Including projects upon which work has not yet been completed, this gives a total of 150 separate units for repair work. Since this information was given out, new repair plant projects have been announced.

New $6,000,000 Repair Plant for Norfolk

Work will soon be begun upon the $6,000,000 ship repair plant of the Hampton Roads Dry Dock & Ship Repair Corporation at Lambert's Point, near Norfolk, Va. James Stewart & Company, Inc., 30 Church street, New York, it is reported, will receive the contract; and since much of the equipment necessary for construction operations is already in the district, work can be started at once.

The construction plans include one 4,000-foot bulkhead, three piers, 900 feet long by 75 feet wide, one drydock to accommodate 10,000-ton vessels, one drydock to accommodate 15,000-ton vessels, twelve buildings, including administration offices, machine shops and foundries. It is said that the actual construction work has been estimated at about $6,000,000.

Shipbuilding at the Consolidated Shipbuilding Corporation's Yards

The Consolidated Shipbuilding Corporation, the new name of the Gas Engine & Power Company and Charles L. Seabury & Company, Con., Morris Heights, N. Y., is engaged in very diverse types of construction. For example, the company is building a 230-foot steel steam yacht, two 74-foot motor yachts, a 45-foot shallow draft tunnel stern boat and four 100-foot wooden harbor tugs. The company is also building an 86-foot yacht and a 52-foot stock cruiser. In contrast may be mentioned the mine sweeper *Tern* recently delivered to the Government—the fifth vessel of this type built by the company.

Private'y Own d	Graving Docks Length 261 to 300	300 to 400	400 to 500	500 to 650	650 & Over	Floating Dry Docks Tons 1500 to 2500	2500 to 3500	3500 to 5000	5000 to 8000	8000 & Over	Marine Rwys. Tons 1500 to 2500	2500 to 3000	3000 to 4000	4000 & Over	Total
New England District	..	..	1	..	1	..	..	..	1	..	7	1	1	..	12
North Atlantic District	..	..	1	1	..	17	6	3	4	8	1	1	..	1	43
Delaware River District	..	1	1	..	..	..	1	..	..	..	1	1	..	..	5
Middle Atlantic District	..	..	1	5	1	2	..	..	..	..	5	..	..	..	14
Southern District (4)	..	..	..	..	..	..	..	1	1	..	1	..	..	..	3
Southern District (5)	..	..	..	..	..	2	..	2	1	..	..	..	..	..	5
Southern Pacific District	..	..	..	..	2	1	1	1	1	2	1	..	..	6	15
Oregon District	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1
Northern Pacific District	..	..	..	..	..	..	..	2	..	4	..	..	1	..	7
Great Lakes District	..	6	6	6	3	..	..	1	..	1	1	..	..	..	24
Total		7	10	12	7	22	8	10	8	16	17	3	2	7	129
United States Shipping Board Emergency Fleet Corporation															
New England District	..	..	..	..	..	..	..	..	..	..	..	2	..	..	2
Middle Atlantic District	..	..	2	..	..	..	..	..	..	1	..	..	1	..	4
Southern Atlantic District (4)	..	..	..	..	..	..	..	..	1	1	..	3	..	..	5
Southern Atlantic District (5)	..	..	..	..	..	..	..	..	..	2	..	1	..	..	3
Gulf District	..	..	..	..	..	..	..	..	..	2	..	1	..	..	3
Southern Pacific District	..	..	..	..	..	..	..	..	..	..	..	1	..	1	2
Oregon District	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1
Northern Pacific District	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1
Total	..	..	2	..	..	..	..	..	1	6	..	8	2	2	21

EMERGENCY FLEET PROGRAMME

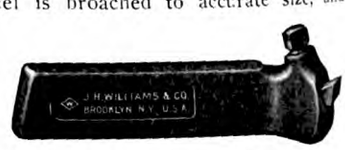
District	Contractor	Location.	Capacity.	Complete or Incomplete.
New England	Crowninshield S. B. Co.	S. Somerset, Mass.—M. R	2 500 T.	C
	Cumberland S. B. Co.	Portland, Me.—M. R	2,500 T.	C.
North Atlantic	Marine Eng. & D. D. Co.	Providence, R. I.	3,200 T.	I.
*Delaware River	American Dredging Co.	Camden, N. J.—M.R.	2,000 T.	I.
Middle Atlantic	Bethlehem S. B. Corp.	Sparrows' Pt., Md.—D.D	20,000 T.	C.
	Geo. Leary Constr. Co.	N. Y., Norfolk, Va.—Twin G. D.	465' Length	I.
Southern (4)	Tampa Dock Co.	Tampa, Fla.—M.R.	2,500 T.	I.
	Federal Marine Rwy.	Savannah, Ga.—M.R.	2,500 T.	I.
	Terry & Brittain.	Savannah, Ga.—D.D.	8,000 T.	I.
	Terry & Brittain.	Jacksonville, Fla.—D.D.	6,000 T.	I.
	Terry & Brittain.	Jacksonville, Fla.—M.R.	2,500 T.	I.
Southern (5)	Alabama D.D. & S.B. Co.	Mobile, Ala.—D.D.	10,000 T.	I.
	Jahncke S. B. Co.	New Orleans, La.—D.D.	10,000 T.	I.
	Henderson S. B. Co.	Mobile, Ala.—M.R.	2,500 T.	C.
Gulf	Beaumont S. B. & D. D. Co.	Beaumont, Tex.—D.D.	8,000 T.	I.
	Galveston D.D. & Const. Co.	Galveston, Tex.—D.D.	10,000 T.	I.
	Beaumont S.B. & D.D. Co.	Beaumont, Tex.—M.R.	2,500 T.	C.
Southern Pacific	Barnes & Tibbitts.	Alameda, Cal.—M.R.	2,500 T.	I.
	Barnes & Tibbitts.	Alameda, Cal.—M.R.	4,000 T.	C.
Oregon	Astoria Marine Iron Works.	Astoria, Ore.—M.R.	4,000 T.	I.
Northern Pacific	Puget Sound M. R. Co.	Tacoma, Wash.—M.R.	3,200 T.	I.

New Line of Agrippa Turning Tools

A new line of set screw pattern turning tools with right- and left-hand offsets and straight shanks is being placed on the market by J. H. Williams & Company, Brooklyn, N. Y. This company manufactures drop forgings and drop-forged tools at its plants in Brooklyn and Buffalo, N. Y. The company's line already includes a wide range of sizes of Agrippa tool holders for all regular machining operations. Several of these styles are fitted with a cutter-fastening device using a cam instead of the usual set screws, as illustrated. The cams are furnished with hexagonal head, or are headless.

Agrippa Turning Tool Holder

The nose of the holder of either cam or set screw turning tools is beveled to permit its use in close quarters. The tools are drop-forged and carefully heat treated. The cutter-holding channel is broached to accurate size, and



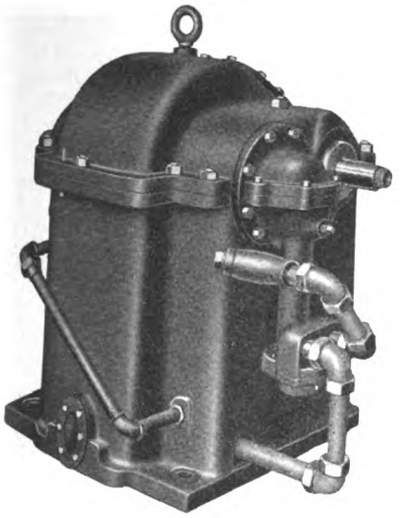
Set Screw Pattern Tool Holder

accordingly provides a rigid seat for the cutter. For usual mill practice the makers recommend turning tools of the cam fastening pattern. However, since this arrangement limits the range of contact, the makers are offering the new line of set screw pattern turning tools. The "diamond point" form or bevel of Agrippa cutters provides for all ordinary requirements with a minimum of grinding for either right- or left-hand usage.

Generated on 2024-09-12 07:53 GMT / https://hdl.handle.net/2027/uiug.30112004006158
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Terry Reduction Gears

Terry reduction gears, which have been unavailable during the past year for public sale because of their use in connection with turbines for destroyers of the United States Navy, are again being placed on the market by the Terry Steam Turbine Company, Hartford, Conn. The Terry gears and pinion, which are of the stub-tooth, double-

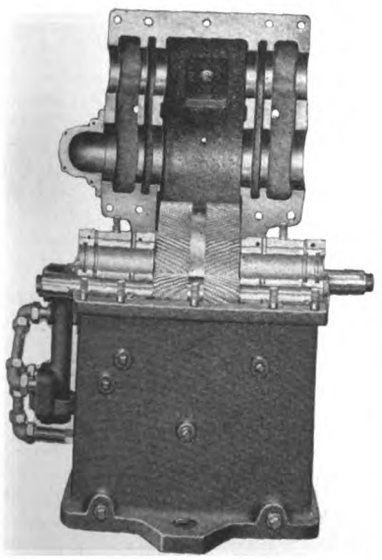


Complete Set of Terry Speed Reduction Gears

helical type, are generated to true form on a Fellows gear shaper. The gears and pinions are interchangeable.

A ribbed, double-walled, box-like structure, extending the full depth of the case, forms a rigid support for each pair of bearings. The space between the walls acts as a water jacket for cooling the oil, while the ribs between the walls serve both as stiffening members and water baffles. The central part of the case, directly under the gears, serves as an oil reservoir, holding sufficient oil to supply both gears and turbine.

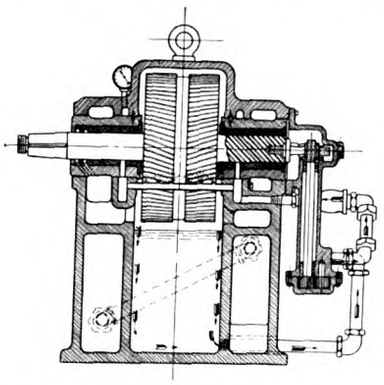
The forced feed oil system is em-



Reduction Gears With Case Removed

ployed. The pump is located well below the oil level in the reservoir, which arrangement avoids suction lift, thereby preventing destruction of the gears in case the pump fails to function. From the reservoir the oil is pumped through direct brass piping to a self-cleaning strainer, thence through distributing passages to large annular oil pockets around each bearing shell, and through the spray pipe from which the oil is sprayed in lubricating the gear teeth. The oil pressure gage is located in one of the annular oil pockets at the point most distant from the oil pump.

The pump and its bevel gear drive form a complete unit without stuffing boxes or exposed running parts. The pump gears may be removed for inspection without disturbing the driving



Sectional View Showing Relation of Pump to Gear

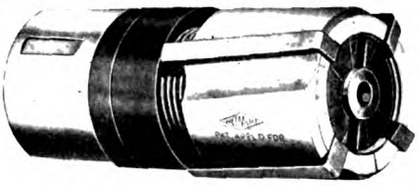
mechanism or oil piping. The bevel gears may also be inspected by removing a small cover. In the water cooling system, which is supplied with all standard equipment, the cooling jackets are located in the bearing ends of the case, so that the heated oil draining from the bearings and gears at once comes into contact with the cooling surfaces before it has had time to heat the oil in the reservoir.

New Expanding Reamer

The Wetmore expanding reamer illustrated is a commercial development of an adjustable type reamer, supplied by the Wetmore Reamer Company, Milwaukee, Wis., to shell manufacturers in the United States and Canada during the war. The left-hand spiral cutting angle of the blades is probably the most advantageous feature of the design, and is clearly shown in the illustration.

In production work of any kind, such as shell, automobile or gear making, where speed in cutting and accuracy are essential, it is claimed that this reamer is of special value. Adjustments to required limits may be made by means of a special wrench provided to manipulate a graduated screw collar in the reamer body. Each graduation on the screw collar indicates one thousandth of an inch in the diameter. The body of the reamer is solid and may be attached to any arbor, although arbors for various machine operations are provided.

Standard reamers are made in sizes from 1 inch to 4½ inches, and blades

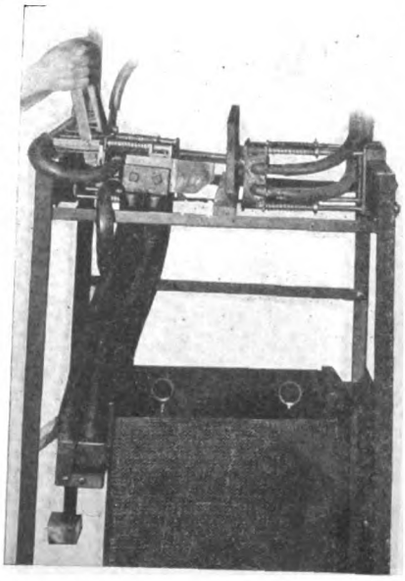


New Wetmore Expanding Reamer. Note Left-Hand Spiral Cutting Angle of the Blades

are packed so that they may be conveniently stored and identified. Four blades are used on reamers up to 3 inches in size, and six blades on larger ones.

Electric Rivet Heating Device

An electrical heating device for rivets, which may be used as an attachment on "bull" or gap riveting machines or on portable hand riveters, has been produced by the United States Electric Company, New London, Conn. For use with "bull" riveters the device is arranged so that a hot rivet is kept in front of the plunger during the riveting operation. The rivets are placed in the rivet holes cold, and the work to be riveted is moved along in front of the electrodes, which may be brought in contact with the rivets either by the motion of the plunger or by the use of a hand lever. The attachments are built to heat rivets of ¼ inch to 1¼ inches in diameter. On recent tests two ¾-inch rivets, with 2½-inch shanks, were heated in 15 seconds; two ⅞-inch rivets, with 2½-inch shanks, in 23 seconds, and two 1-inch rivets, with 2½-inch shanks, in 30 seconds.



New Rivet Heating Device Used With Gap Riveting Machines or Hand Riveters

Generated on 2024-09-12 07:51 GMT / https://hdl.handle.net/2027/uiug.30112004006158
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

The electrodes are so constructed that two rivets may be heated at once in about the time generally required to heat one. This is accomplished by bringing one rivet to the proper heat, while the other is being pre-heated, so that a continuous line of hot rivets is kept on the way to the plunger of the gap riveter at all times during the operation.

ATTACHMENT APPLIED TO PORTABLE RIVETING MACHINE

In the case of portable riveting machines the device is designed for use with rivets not over ⅝ inch in diameter. It is made to operate in conjunction with the pneumatic hammer.

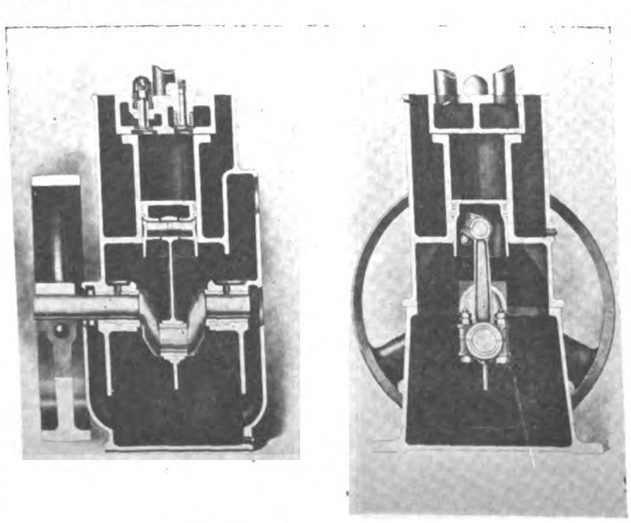
The operation is rather simple, the tool being attached to either the riveting hammer or the holder-on. Cold rivets are placed in holes shaped to size, the holder-on comes in contact with the rivet as in an ordinary case, but here the electrode is brought in contact with the head of the rivet. Heat is maintained until the desired intensity is reached, then the rivet is headed by turning the air gun around.

The electrode is attached to the side of the riveting gun, allowing two rivets to be heated at once by the use of a bridging conductor, which makes the device useful in heading rivets from one side of a plate, the outside of a boiler or in restricted spaces. Equipments are available in all sizes and for use with 110-volt and 220-volt currents.

Imperial "Fourteen" Small Air Compressor

On April 15 the Ingersoll-Rand Company, 11 Broadway, New York, placed on the market a small air compressor of new design, known as the Imperial Fourteen. These new standard compressors, which are built in four sizes, provide a capacity ranging from 3 to 45 cubic feet per minute at pressures to 100 pounds per square inch, although they can be used for pressure requirements up to 200 pounds by increasing the horsepower. They are single-acting, belt-driven machines of the vertical type. Where they are designed to be driven from a line shaft, however, tight and loose pulleys are supplied. When designed to be used with an independent motor, they are furnished as a unit complete with the motor, endless belt and short-drive attachment. In the latter case, a hardwood base plate is included.

The smallest size is built with an air-cooled, ribbed cylinder for intermittent service, and with water-cooled cylinder of the reservoir type for continuous operation. The larger machines are water-cooled only; in the case of the largest size, a closed jacket for connection to the pressure system is optional.

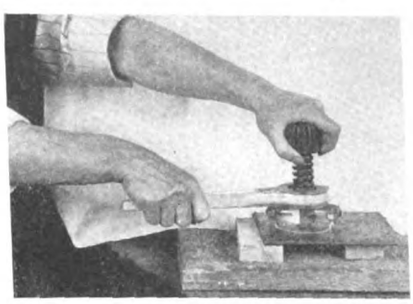


Section of Imperial 14 Compressor

Electric Trucks Being Used in San Francisco for Cargo Handling

As the result of successful experiments conducted by the Pacific Mail Steamship Company at its San Francisco piers, other shipping concerns in the city are arranging to utilize electric labor-saving equipment on their piers.

The Toyo Kisen Kaisha plans to introduce electric trucks on Pier 34, and has requested that the flooring of the pier be leveled by the Board of State Harbor Commissioners and that the pier be wired. The Matson Navigation Company at the same port is wiring Piers 30 and 32, so that they may utilize electric-handling machinery.



Cutting Tool in Operation

Submarine Boat to Produce Large Power Diesel Engines

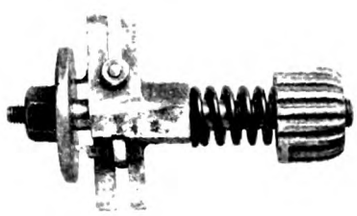
The 1918 report of the Submarine Boat Corporation, which is associated with the New London Ship & Engine Company, specialists in Diesel engine building, contains the following statement:

It is expected that during the coming year Diesel engines of large power will be produced by us which will create a large business for the manufacturing facilities of the company, and may require additional plants for the manufacture of such Diesel engines in quantity. * * * The commercial value of the large Diesel engines for the operation of cargo vessels has been demonstrated by certain engines of European design, and we believe that these results can and will be fully equaled, if not excelled, by the engines to be produced by this company.

Portable Cutting Tool

As a portable tool for cutting large holes in places where the acetylene flame might not be entirely practical, the adjustable cutter illustrated below should be of value to the shipbuilder. The cutter consists of a chuck holding two cutting tools adjustable for various diameters from 1¼ to 6 inches. Pressure is applied to the cutting tools by means of a heavy spring. A ratchet wrench is used to rotate the chuck to cut a round, clean hole through steel plates up to ½ inch in thickness. Since this Jiffy cutter, which is put on the market by Koch & Sandidge, Chicago, Ill., is light, it will be found very handy on board ship for cutting holes in electrical cabinets, metal lockers and through bulkheads. It will also be found of value in the shipyards for emergency work while ships are in the process of being assembled.

Former Hand Method



Portable Cutting Tool

$25,000,000 Terminal Development for Berkeley, Cal.

The first details of a vast project for terminal developments in the Berkeley tidelands, Berkeley, Cal., have recently been made public. According to reports the improvements include the building of a huge pier 3,000 feet wide and extending 18,000 feet into the bay from the present high water mark.

Generated on 2024-09-12 07:53 GMT / https://hdl.handle.net/2027/uiug.30112004006158
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Marine Construction News of the Month

Ships, Shipyards and Shipyard Improvements—Terminal Projects—Launchings—Government Contracts

NEWS OF SHIP CONTRACTS

The Providence Engineering Company, Providence, R. I., has received a contract from the United States Shipping Board to construct and equip ten steel tugs, each 150 feet long. The hulls are being built at City Island, N. Y. Five of the vessels are to be oil burners and the others will use coal.

C. C. Galbraith & Son, 90 West street, New York, has received a contract to furnish three 28-foot boats to the Lighthouse Department, Tompkinsville, N. Y.

The Gothenburg Shipbuilding Company, Gothenburg, Sweden, has received a contract to build eight new motorships for the Transatlantic Shipping Company. The vessels are to be 440 feet long, 54-foot beam, with a load draft of 26 feet.

The Motorship Construction Company, Vancouver, Wash., has received a contract from the Union Fishermen's Co-operative Packing Company, Astoria, Ore., for the construction of a small concrete barge, 58 feet long, 24 feet beam and 6 feet deep.

The Canadian Dominion Government has awarded contracts to Canadian shipyards for forty-five steel ships. These contracts amount to about $42,000,000. In addition to these ships the yards are at work on foreign contracts.

The Bureau of Yards and Docks, Navy Department, Washington, D. C., opened bids on June 18 for furnishing a 12-inch hydraulic steam-driven dredge at Paris Island, S. C.

The Bertelsen & Petersen Engineering Company, East Boston, Mass., has received a contract to repair the Russian bark *Professor Koch* in 48 days. The work will cost about $60,000.

The Merrill-Stevens Company, Jacksonville, Fla., is building a large oil barge for the Mexican Petroleum Corporation. The barge is 150 feet long, 30 feet wide and 5 feet deep. Propelling engines will be installed.

W. K. McKean, Tufts Cove, Halifax, N. S., is building a 155-foot tern schooner.

The Howse Construction Company on the Meteghan River, N. S., is at work on a 155-foot tern schooner.

The National Shipbuilding Company, Orange, Tex., has begun the construction of ship No. 15 on the new contract which is held from the Emergency Fleet Corporation.

The Texas Steamship Company, Bath, Me., is building four large schooners and two small schooners.

The Scotia Shipbuilding Company, North Yarmouth, N. S., is building a new schooner.

John Young, Honolulu, T. H., is negotiating for the purchase of a powerful tugboat to be equipped with fire-fighting apparatus and used as a patrol boat. It will cost about $100,000.

The Greenport Ship Company, Greenport, L. I., is building a 145-foot steam steel trawler.

PROPOSED CONSTRUCTION

Coaling Tower, Halifax, N. S.—A coaling tower located at Halifax, N. S., was recently badly damaged. Replacement or repair of the tower will cost $20,000.

Concrete Water Barge, San Francisco, Cal.—Harvey & Roberts, San Francisco, Cal., are planning to build a concrete water barge. The plans call for a vessel 65 feet long, 22 feet wide and 9 feet deep, as designed by D. W. & R. Z. Dickie.

Docking Facilities, Vancouver, Wash.—The Port of Vancouver Commission, Vancouver, Wash., has $25,000 now available to build import and export docking facilities. W. Schwartz is city engineer.

Dredging, Shrewsbury River, Shoal Harbor and Compton Creek, N. J.—The United States Engineer Office, 39 Whitehall street, New York City, will solicit bids until July 2 for the dredging of the Shrewsbury River and Shoal Harbor and Compton Creek, N. J.

Dredging, Baltimore, Md.—The United States Engineer Office, Custom House, Baltimore, Md., is ready to contract for the dredging of Curtis Bay Channel. The work will cost about $250,000.

Drydock, Boston, Mass.—S. W. Wakeman, general manager of the Fore River Shipyards, Quincy, Mass., announces that Boston will have a new drydock to cost $5,000,000, which will be constructed by November 15. The port can hereafter be used for repairs.

Drydock, Pensacola, Fla.—The Emergency Fleet Corporation has advanced the city of Pensacola, Fla., $500,000 for the erection of a 5,000-ton drydock. This dock will be built and operated by the Bruce Dry Dock Company, which will spend in addition $200,000 for repair shops, etc.

Drydock, Charleston, S. C.—The Navy Department has announced that the bids received for the construction of the 1,000-foot drydock in Charleston, S. C., were not satisfactory, as all figures were estimated on the cost plus basis plan, which was contrary to the conditions laid down by the Bureau of Yards and Docks. The project will probably be readvertised in the near future.

Earthwork Construction, Muscatine-Louisa Island Levee District, Ia.—Bids were opened on June 19 by the secretary of the Mississippi River Commission, 1311 International Life building, St. Louis, Mo., for earthwork construction by hydraulic method in the Muscatine-Louisa Island Levee District, Ia.

Electric Distributing System, Hampton Roads, Va.—The Bureau of Yards and Docks, Navy Department, Washington, D. C., plans to install an electric distributing system at Hampton Roads, Va., to cost about $60,000.

Fruit Wharf, New Orleans, La.—The Dock Board, New Orleans, La., is planning to construct a steam-heated fruit wharf with 1,000 feet frontage to cost $400,000.

Industrial Building, Hampton Roads, Va.—The Bureau of Yards and Docks, Navy Department, Washington, D. C., has had plans prepared for an industrial building to cost $325,000 at the navy yard at Hampton Roads, Va.

Levee, Helena, Ark.—The St. Frances Levee District, Bridge Junction, Helena, Ark., plans to construct a levee at a cost of $200,000. H. N. Pharr, chief engineer, Bridge Junction, will receive bids until July 1.

Lightship, Diamond Shoals, Cape Hatteras.—Secretary of Commerce Redfield is urging the appropriation of $450,000 for the construction of a new lightship to be stationed off Diamond Shoals, Cape Hatteras.

Marine Railway, R. I.—The Bureau of Yards and Docks, Navy Department, Washington, D. C., has planned to build a marine railway to cost $15,000. Bids are solicited at the local yards.

Municipal Pier, Gulfport, Tex.—The city of Gulfport, Tex., plans to build a pier ot cost about $7,200.

Oil Distributing Plant, Savannah, Ga.—The Gulf Refining Company, Savannah, Ga., plans to erect a large oil distributing plant to cost about $500,000. Extensive wharfage facilities will also be built. William B. Lamb, Jacksonville, Fla., is the construction superintendent.

Pier, Port Orford, Ore.—A port district was created at a recent election in Curry County, Ore., for the purpose of permitting construction of a suitable loading and discharging pier to handle lumber and incoming freight at Port Orford.

Generated on 2024-09-12 08:03 GMT / https://hdl.handle.net/2027/uiug.30112004006158
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Sand and Gravel Scows, Washington, D. C.—The Columbia Granite & Dredging Company, 3036 K street, Washington, D. C., solicits prices on scows to carry sand and gravel on the Potomac River, capacity 125 to 200 yards.

Piers and Warehouses, Fayetteville, N. C.—The city of Fayetteville, N. C., has engaged Pierce & Alsop, Newport News, Va., to prepare plans for building piers and warehouses on the Cape Fear River. About $75,000 will be spent in the project.

Pilot Boat, San Francisco, Cal.—The Bar Pilots Association, San Francisco, Cal., Capt. John Wallace, secretary, has prepared plans for a new pilot boat, which will be submitted to the builders for bids as soon as the expected increase in shipping in the port materializes. The vessel will be 110 feet long along the waterline and have a beam of 28 feet.

Plant Improvements, Fort Pierce, Fla.—Backus & Son are planning to enlarge and improve their plant, adding facilities to enable them to consider motor boats for the Government.

Port Developments, Tacoma, Wash.—Bonds to the amount of $2,500,000 were voted at a recent election in Tacoma, Wash. Plans have been drawn by Frank J. Walsh, port engineer.

Port Improvements, Gray's Harbor, Wash.—It is reported by A. C. McNeil, Port Commissioner of Montesano, Wash., that the Government will spend $10,000 for improvements at Gray's Harbor, and such further sum as may be necessary in order to deepen the channel of the inner harbor, the main shoal of which is opposite Gray's Harbor City.

Power House, Montauk, N. Y.—The Bureau of Yards and Docks, Navy Department, Washington, D. C., may be addressed concerning a power house at Montauk, N. Y., to cost about $4,000.

Power House and Fire Protection System, Key West, Fla.—The Bureau of Yards and Docks, Navy Department, Washington, D. C., plans the building of a power house and fire protection system at Key West, Fla., to cost about $20,000.

Power Plant, Indianhead, Md.—The Bureau of Yards and Docks, Navy Department, Washington, D. C., is asking for bids for the construction of a power plant at Indianhead, Md., to cost about $200,000.

Power Plant, Algiers, La.—About $539,000 has been appropriated for the construction and enlargement of buildings at the navy yard in Algiers, La. A central power plant is to be installed at an estimated cost of $280,000 and the coaling wharf extended, which will entail an expenditure of $100,000.

River Snag Boat, San Francisco, Cal.—The California Debris Commission, San Francisco, Cal., has opened bids for the construction of a river snag boat. Schultz & Schultz, who offered to construct the vessel for $25,644, were the lowest bidders.

Shipbuilding Plant and Floating Drydock, Lake Union, Wash.—Capt. Mark Pedersen, Sr., has completed arrangements for the leasing of two large areas of shore lands on Lake Union, Latona district, Washington, as a site for a ship construction plant and floating drydock. The company will be incorporated for $50,000 on July 1, and will be known as the University Dry Dock & Construction Company.

Ship Construction and Repair Plant, Norfolk, Va.—The Norfolk-Hampton Roads Dry Dock & Ship Repair Company, Norfolk, Va., is planning the erection of a plant for repairing and constructing steel and wooden vessels.

Steam Schooner, St. Helens, Ore.—The Charles R. McCormick Company, which operates the St. Helens Shipbuilding Company's yard, St. Helens, Ore., is planning to build a steam schooner.

Steel Barge, Port Arthur, Tex.—The Gulf Refining Company, Port Arthur, Tex., G. N. Bliss, marine superintendent, is planning the construction of a steel barge for bunkering purposes to be used in connection with the $500,000 distribution plant to be erected on Hutchinson Island, Savannah, Ga.

Steel Mill, New Orleans, La.—A plan is under way to establish a $100,000 steel rolling mill at New Orleans, La. New Orleans offers an excellent local market for steel products in the shipyards. Bolts, rivets and nuts, as well as other small parts, could be turned out at first, and later it might be found profitable to turn out ship plates.

Steel Tugs, New York.—W. J. Rountree, 23 Beaver street, New York City, is in the market for two 100-foot steel tugs.

Terminal, Boston, Mass.—The United States Shipping Board Emergency Fleet Corporation is considering the construction of a large terminal project near the Charleston Navy Yard, Boston, Mass. Details regarding this development will be given out later.

Terminal, Robbins' Reef, N. Y.—The Lord Construction Company, New York, has proposed to the New Jersey State Board of Commerce and Navigation the construction of a huge terminal on Robbins' Reef in New York harbor. The work would be carried on by a new concern known as the Jersey Dock & Terminal Company, and would include the building of two huge railway trestles connecting the island to the mainland. The island itself would be equipped with piers and warehouses of the latest design.

Terminal, Rahway River, N. J.—H. McL. Harding, terminal engineer, New York City, has been retained to prepare plans for a large terminal of about 5,900 feet frontage and 900 feet in depth, on the north bank of the Rahway River, which empties into Staten Island Sound. A concrete cold storage warehouse, fish shed and pontoon are also included in the plans. The estimated cost of construction is $2,400,000.

Terminal, Arthur Kill, Staten Island Sound, N. J.—H. McL. Harding, terminal engineer, New York City, is now preparing plans for the development of four terminal units, each 600 feet in frontage and about 1,300 feet in width along a 2,400-foot berthing frontage on the Arthur Kill, Staten Island Sound, N. J. Each unit will have modern facilities—a concrete quay wall, paved surfaces, railway tracks for dock coordination between water and railway, traveling gantry jib cranes, drayways, motor trucks and other mechanical equipment. The estimated cost of the facilities and equipment is about $1,200,000. Actual construction will not be started within three months.

Terminals, Halifax, N. S.—It is reported that the Canadian Government will spend several million dollars to improve harbor facilities at Halifax. Plans for new ocean terminals will provide berthing accommodations for 27 large liners, which will occupy a mile and a half of the waterfront at the southern end of the city.

Terminal Development, Berkeley, Cal.—A vast project for terminal development at Berkeley, Cal., was recently made public. Reports state that the improvements include the building of a huge pier, 3,000 feet wide and extending 18,000 feet into the bay from the present high water mark. Deep water channels will be dredged on each side of the pier. Strict secrecy is maintained as to the identity of the interests behind this project.

Waterfront Improvements, St. Paul, Minn.—The city of St. Paul, Minn., is planning improvements to the waterfront on both sides of the Mississippi River. A. Claussen is city engineer.

Wharf, Harbor Island.—The General Petroleum Corporation, Seattle, Wash., plans to build a 600-foot wharf on Harbor Island. W. A. Dudley, district manager, has charge of this work.

Wharf, Newport Beach, Cal.—P. Kressley, engineer, Newport Beach, Cal., is preparing plans for the construction of a wharf 60 by 200 feet at that port.

Wharves and Docks, Pensacola, Fla.—The United Fruit Company, Pensacola, Fla., is planning to construct wharves and docks for handling vessels. Government appropriation has already been received for a wharf and deepening of the harbor.

CONTRACTS LET FOR HARBOR IMPROVEMENTS

Dredging, Hog Island, Boston, Mass.—The Bay State Dredging & Development Company, 62 Condor street, Boston, Mass., has received a contract for dredging the channel and turning turning basin near Hog Island, Boston harbor.

Generated on 2024-09-12 08:05 GMT / https://hdl.handle.net/2027/uiug.30112004006158
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

EQUIPMENT

Boilers, Providence, R. I.—It has been announced that the Field's Point plant of the Bethlehem Shipbuilding Corporation expects to receive large contracts for boilers.

Buoys, Long Island City, N. Y.—The Le Cour Iron Works, Inc., Long Island City, N. Y., has received a contract for furnishing one "L" buoy at a cost of $1,288.

Buoys, Lebanon, Pa.—The Lebanon Boiler Works, Lebanon, Pa., has received a contract to furnish seven "L" type buoys to the Third Lighthouse District to cost $10,346.

Chain Cables.—The Lighthouse Superintendent, 341 Postoffice building, Detroit, Mich., opened bids on June 12 for furnishing 90 fathoms of 1⅜-inch stud link chain cables for light vessel use.

Electric Capstans, Albany, N. Y.—Superintendent of Public Works L. Nixon, Albany, N. Y., opened bids on June 3 for the installation of ten electric capstans and two electric trolley hoists at barge canal terminals. About $14,000 and $1,000, respectively, will be spent for this work.

Electric Traveling Cranes, Transfer Bridges, Electric Freight Elevator, Hampton Roads, Va.—The Navy Department, Bureau of Yards and Docks, Washington, D. C., may be addressed concerning the installation of two electric traveling cranes, the building of two transfer bridges and the building of an electric freight elevator at Hampton Roads, Va.

Machinery, Mobile, Ala.—The Marine Equipment Company, Mobile, Ala., is in the market for machinery to manufacture anchors, winches and other ship supplies. Rolf Seeberg is president of the company.

Marine Engines, Miami, Fla.—The Miami Anglers' Boat Company, Hotel Urmey building, Miami, Fla., is in the market for twelve marine engines capable of driving 32-foot boats, 30-inch draft, 9-foot beam, at 12 miles per hour.

Motors, Baltimore, Md.—The Union Shipbuilding Company, Fairfield, Baltimore, Md., is planning to install several motors aggregating 220 horsepower.

Plate Working Machinery, Violet, La.—The National Shipbuilding Company, with yards at Three Rivers, Quebec, and Violet, La., has purchased second-hand plate-working machinery for installation at the Violet yard.

Propellers, Astoria, Ore.—The Astoria Marine Iron Works, Astoria, Ore., has received a contract to supply 60 propellers for foreign account.

Traveling Cranes, Mare Island, Cal.—The Bureau of Yards and Docks, Navy Department, Washington, D. C., is soliciting bids for the erection of three traveling cranes in the Mare Island, Cal., structural shop to cost about $250,000.

Salvage Equipment, Spain.—It is reported by Vice-Consul W. Bruce Wallace, Corunna, Spain, that an important salvage company has been organized by Spanish capitalists, and although the company is well equipped, new purchases are constantly being made of the lastest devices pertaining to deep-sea salvage operations, also machinery for the reduction of salvage materials.

NEW SHIPYARDS AND SHIPYARD EXTENSIONS

Coppersmith, Tinsmith and Pipe Shops, Alexandria, Va.—The Virginia Shipbuilding Corporation, Alexandria, Va., has started to rebuild their coppersmith, tinsmith and pipe shops, recently destroyed by fire. The copper and tinsmith shops are being completely refitted with new tools and machinery for building all sizes of copper piping, bends, expansion bends, copper expansion joints, sheet metal cowls, tanks, ventilators, steam tables, etc.

Drydock, San Pedro, Cal.—The Southwestern Dry Dock Company, San Pedro, Cal., has been capitalized at $1,000,000 to build a drydock.

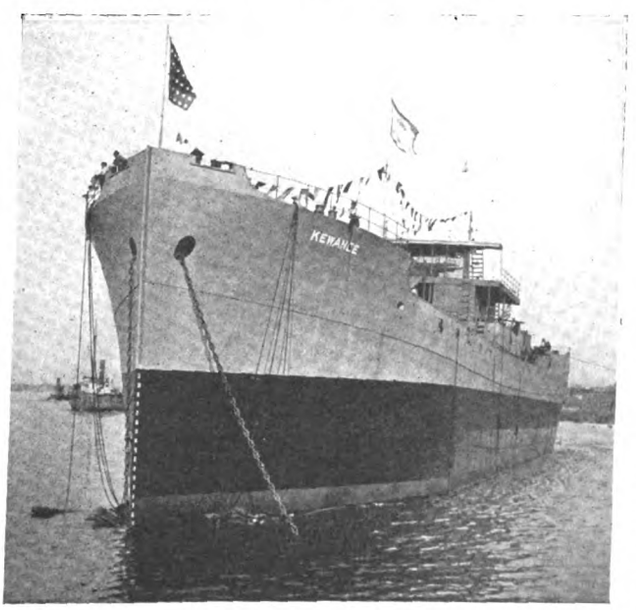
Drydock, Kingston, Jamaica.—The Jamaica West Indies Government is considering a plan for harbor improvement. It is proposed to construct a drydock and an up-to-date coaling station.

Drydock, Seattle, Wash.—Construction has been begun on the first two pontoons of an 18,000-ton drydock which the Ames Shipbuilding & Dry Dock Company, Seattle, Wash., is constructing. The drydock will have a total length of 540 feet, which will accommodate a ship 650 feet long. The work is being carried out under the supervision of C. J. Carlson, owner of the Carlson yard in Port Blakeley. The pontoons will be fitted with 50-foot towers and electric-driven pumping apparatus will be installed.

Drydock, Brooklyn, N. Y.—An appropriation of $6,000,000 is being arranged by the Navy Department, Washington, D. C., for the reconstruction and improvement of drydock No. 3, navy yard, Brooklyn, N. Y., to include construction and repair facilities for ship work.

Foundry and Machine Shop, Vancouver, B. C.—The Mainland Engineering Company, 442 Railway street, Vancouver, B. C., has received bids through its architects, Gardiner & Mercer, 827 Burkes building, Vancouver, B. C., for the erection of a pattern shop, foundry and machine shop at the plant.

General Repair and Machine Shop, East Boston, Mass.—The Simpson Dry Dock Company, East Boston, Mass., is building a new plate shop 100 by 30 feet, and a machine shop 100 by 60 feet, to provide facilities for general repairing. Both plants will be run by electric power.



Launching the *Kewanee*

Moore Plant of Bethlehem Shipbuilding Corporation Shows Good Record

Since November 20, 1918, the Moore plant of the Bethlehem Shipbuilding Corporation, Elizabeth, N. J., has launched fourteen ocean-going tugs and delivered ten. In addition this shipyard has launched the 5,000-ton tanker *Kewanee*.

Machine Shop, Mariner's Harbor, S. I.—The Brewer Dry Dock Company, Richmond Terrace, Mariner's Harbor, S. I., has awarded a contract to John Milnes Company, Port Richmond, S. I., for the building of a $16,000 machine shop.

Marine Repairs, New York.—A. J. Wolcott & Company, New York, has been incorporated, with a capital stock of $10,000, to carry on a marine repair and contracting business. J. Groenewald, L. R. Swift and A. J. Wolcott, 439 Eightieth street, Brooklyn, N. Y., are the incorporators.

Plate Mill and Machine Shop, Halifax, N. S.—The Halifax Shipyards, Ltd., Halifax, N. S., has let a contract to the Bedford Construction Company, Barrington, street, for the erection of a plate mill to cost about $300,000, and also a machine shop.

Pontoons, Rockaway Beach, L. I.—

Generated on 2024-09-12 07:50 GMT / https://hdl.handle.net/2027/uiug.30112004006158
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

The Arverne Shipyards, Inc., Rockaway Beach, L. I., has received a Government contract to build several pontoons for drydocks.

Repair Plant, Eagle Harbor, Wash.—James Griffiths & Sons, Eagle Harbor, Wash., have again taken over the general ship repair plant which has recently been operated by the Winslow Marine Railway & Shipbuilding Company, and will operate the plant for general repair work.

Repair Plant, Norfolk, Va.—Work will soon be started on the $6,000,000 ship repair plant of the Hampton Roads Dry Dock & Ship Repair Corporation at Lambert's Point, near Norfolk, Va. It is reported that James Stewart & Company, Inc., 30 Church street, New York, will receive the contract. The construction plans include one 4,000-foot bulkhead, three piers, 900 feet long by 75 feet wide, one drydock to accommodate 10,000-ton vessels, one drydock to accommodate 15,000-ton vessels, twelve buildings, including administration offices, machine shops and foundries.

Ship Repair Plant, Oswego, N. Y.—The Hinckley Towing Company, Oswego, N. Y., is planning to erect a new ship repair works. The plant is estimated to cost about $100,000, and will include machine tools and machinery for ship repairs and construction, drydock, marine railway, cranes, hoisting machinery, etc.

Shipyard, Kingston, N. Y.—The capital of the W. F. & R. Boat Builders, Inc., Kingston, N. Y., has been increased from $10,000 to $60,000.

Shipyard, Newcastle, N. B.—It is reported that the International Shipbuilding Company's yard at Newcastle, N. B., has been sold to the Miramishi Construction Company.

Shipyard, Chattanooga, Tenn.—The Tennessee River Navigation Company, Chattanooga, Tenn., is planning to lease a five-way shipyard to be erected by a local corporation at Chattanooga, Tenn., to be used for building and repairing river steamers.

Shipyard Improvements, Sparrow's Point, Md.—The Bethlehem Steel Corporation, Bethlehem, Pa., will spend between $25,000,000 and $40,000,000 in improvements at the Sparrow's Point plant. This will be in addition to the $50,000,000 improvements now being completed. Ten ships will be added to the present ore fleet of the corporation.

T. A. Scott Succeeds Bainbridge Colby on the Shipping Board

Thomas A. Scott, of New London, has been appointed a commissioner of the United States Shipping Board to succeed Bainbridge Colby, who resigned several weeks ago.

Mr. Scott is president of the P. A. Scott Towing, Pile Driving & Wharf Building Company, and F. Scott Investment Company, both of New London. He is now a lieutenant commander in the United States Naval Reserve force.

PERSONALS

Capt. Elworth P. Bertholf has resigned from the Coast Guard Service to become vice-president of the American Bureau of Shipping.

John E. Barber, who has acted as Chairman Edward N. Hurley's assistant in studying shipping conditions abroad, has been appointed vice-president of the Emergency Fleet Corporation in charge of sales, with offices at 135 Broadway, New York City.

F. G. Echols, for many years general manager of the small tools department of Pratt & Whitney Company, Hartford, Conn., has accepted a position as vice-president of the Greenfield Tap & Die Corporation, Greenfield, Mass.

W. R. Robinson, who for the last five years has been Seattle manager for W. R. Grace & Company, has severed his connection with that firm to become Eastern representative of the Northwestern Trading Company, with offices in New York City.

M. J. Scammell has resigned as assistant general manager of the Sparrow's Point plant of the Bethlehem Steel Corporation, with which he has been connected since 1912.

Miss Ruth Edwards, for twelve years treasurer of the Bantam Ball Bearing Company, Bantam, Conn., has resigned.

William W. Cropley, who received his shipbuilding training at Denny's, Dumbarton, Scotland, and who for the past nine years has been connected with the Robins Dry Dock & Repair Company, Brooklyn, N. Y.; the New England Paper Mills Company and the Tietjen & Lang Dry Dock & Repair Company, Hoboken, N. J., has been made assistant superintendent of the Ramberg Dry Dock & Repair Company, Brooklyn, N. Y.

Homer L. Ferguson, president of the Newport News Shipbuilding & Dry Dock Company, Newport News, Va., has been elected a member of the Council of the National Merchant Marine Association.

E. A. Hitchcock, formerly connected with the E. W. Clark & Company Management Corporation as advisory, consulting and power sales engineer, has recently became connected with the Bailey Meter Company, Cleveland, Ohio, as vice-president, to supervise the training of technical graduates for the company's service and sales departments.

Calvert Townley, assistant to the president of the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has been elected president of the American Institute of Electrical Engineers.

L. A. Block, who has served as resident inspector of marine propulsion units at the De Laval Steam Turbine Company, Trenton, N. J., for the Shipping Board Emergency Fleet Corporation, has been transferred to the Fore River plant of the Bethlehem Shipbuilding Corporation, Quincy, Mass., to assume a similar position. He is succeeded by J. K. Etter, formerly inspector of turbines at the Westinghouse plant, Chester, Pa.

Ray B. Whitman, a Chicago naval architect, who has recently been connected with the Emergency Fleet Corporation at Cleveland, Ohio, has opened offices at 505 Fifth avenue, New York City, to practice as patent attorney and engineer.

RECENT LAUNCHINGS

The Albina Engine & Machine Works, Inc., Portland, Ore., launched the 3,800-ton steel steamer *Meriden* on May 22.

The American International Shipbuilding Corporation, Hog Island, Pa., launched its twenty-seventh ship, the *Shaume*, on May 10; its twenty-eighth ship, the *Ogontz*, on May 20; the 7,500-ton ship, *Salvation Lass*, on May 24; five cargo vessels, each 7,800 tons, namely, the *Lehigh*, *Maiden Creek*, *Nedmac*, *Shavano* and *Pipestone County*, on May 30, and the thirty-fifth ship, the *Fluor Spar*, on June 7.

The Ames Shipbuilding & Dry Dock Company, Seattle, Wash., launched the 8,800-ton steel steamship *West Islcta* on May 15.

Barbare Bros., Tacoma, Wash., launched the Ferris type vessel *Imumka* on May 30. This is the last wooden vessel under construction at that yard for the United States Shipping Board.

The Bayles Shipyard, Inc., Port Jefferson, L. I., launched a 5,000-ton steamer and an ocean-going tug, the *Bastrop*, on May 31, building for the United States Shipping Board.

The Beaumont Ship Building & Dry Dock Company, Beaumont, Tex., recently launched the Ferris type vessel *Angelina*.

The Bethlehem Shipbuilding Corporation, Bethlehem, Pa., has recently launched the following ships: (Squantum) the destroyer *Swasey*, on May 7; (Fore River) the destroyer *Welles*, on May 8; (Alameda) the oil tanker *De Volente*, on May 13; (Potrero) the destroyer *Stansbury*, on May 16; (Union) the destroyer *No.* 108, on May 16; (Quincy) the destroyer *Meade* and the submarines *R*-9 and *AA*-3, on May 24; (Union) the submarines *Wood* and *Zeilin*, on May 28; (Squantum, the torpedo-boat destroyer *Sinclair*, on June 2.

OBITUARY

Paul M. Einert, special representative to the chairman of the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., with offices in New York, died suddenly on June 5 at his home in New York City, aged 51 years.

Generated on 2024-09-12 07:52 GMT / https://hdl.handle.net/2027/uiug.30112004006158
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN